Search Report
EIC 1700

STIC Database Tracking Number: 241484

To: EUGENIA WANG
Location: REM-6C61
Art Unit: 1795
Thursday, November 01, 2007
Phone: (571) 272-4942
Case Serial Number: 10 / 620675

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Search Notes

Search and Information Resources Administration

Banks, Kendra 241490

From: EUGENIA WANG [eugenia.wang@uspto.gov]

Sent: Thursday, October 25, 2007 5:37 PM

To: STIC-EIC1700

Subject: Database Search Request, Serial Number: 10/620675

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Case serial number: **10/620675**
Class / Subclass(es): **429/33, 306, 314, 30, 317**
Earliest Priority Filing Date: **7/15/03**
Format preferred for results: **Paper**
Attachments: **No attachment.**
Search Topic Information:

The method of claim 1: electrodepositing a polymeric electrolyte on a substrate. Please look for embodiments wherein the substrate is a porous stainless steel. NOTES: (1) The polymeric electrolyte solution embodied in this application is Nafion, FLEMION, DOW XUS (chemically: perfluorinated sulfonic acid, perfluorosulfonate ionomer). (2) Electrodeposition may also be known as: electrodeposition, electroplating, electrophoretic deposition, electrolytic/electrolyte deposition, electrocoating, electrophoretic coating, electrophoretic painting.

Special Instructions and Other Comments:

11/1/07

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L93  ANSWER 1 OF 23  HCAPLUS  COPYRIGHT 2007 ACS on STN
AN   2007:705861  HCAPLUS
DN   147:103937
TI   Electrolytic cell for metal deposition
IN   Sali, Stefano; Guarnuccio, Riccardo; Oldani, Dario; Carrettin, Leonello;
     Rossi, Paolo
PA   Industrie De Nora S.p.A., Italy
SO   PCT Int. Appl., 19pp.
     CODEN: PIXXD2
DT   Patent
LA   English
FAN.CNT 1
     PATENT NO.          KIND   DATE        APPLICATION NO.        DATE
     ---------------     ----   --------    --------------------   --------
PI   WO 2007071713        A1    20070628    WO 2006-EP69982        20061220
         W:  AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH,
             CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD,
             GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN,
             KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LV, LY, MA, MD, MG, MK,
             MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO,
             RS, RU, SC, SD, SE, SG, SK, SL, SM, SV, SY, TJ, TM, TN, TR, TT,
             TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW
        RW:  AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE,
             IS, IT, LT, LU, LV, MC, NL, PL, PT, RO, SE, SI, SK, TR, BF, BJ,
             CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG, BW, GH,
             GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY,
             KG, KZ, MD, RU, TJ, TM
PRAI IT 2005-MI2420        A      20051220
AB   The invention relates to an electrolytic cell of
     vertical cylindrical design provided with a coaxial central anode and
     tangentially oriented inlet and outlet nozzles in order to establish a
     spiral upward electrolyte flow particularly suitable for the
     deposition of metals starting from solns. of medium-low
```

concentration The cell is of the type equipped with an elastic sleeve mech. forced into the cathode body: the metal is **deposited** on the sleeve which at the end of the **electrolysis** can be extracted from the cathode body together with the **deposit**. The anode consists of a thin-walled metal tube containing an internal metal rod welded thereto and further equipped with a protecting net of plastic material, said anode and said net being resp. directed to prevent the dendrite growth and the possible deformation of the elastic sheet from causing short-circuits. In one preferred embodiment, the internal metal rod of the anode has a length lower than the thin-walled tube.

CC 72-8 (Electrochemistry)
Section cross-reference(s): 47, 56

ST **electrolytic cell** metal **deposition** spiral upward **electrolyte** flow

IT **Electrodeposition**
Electrolytic cells
(**electrolytic cell** for metal **deposition**)

IT Metals, processes
RL: FMU (Formation, unclassified); PEP (Physical, engineering or chemical process); FORM (Formation, nonpreparative); PROC (Process)
(**electrolytic cell** for metal **deposition** with spiral upward **electrolyte** flow comp frombody)

IT Catalysts
(**electrolytic cell** for metal **deposition** with spiral upward **electrolyte** flow comprising anode **coated** with)

IT **Coating** materials
(**electrolytic cell** for metal **deposition** with spiral upward **electrolyte** flow comprising anode **coated** with catalyst)

IT Elastic materials
(**electrolytic cell** for metal **deposition** with spiral upward **electrolyte** flow comprising elastic sleeve body)

IT Cathodes
(**electrolytic cell** for metal **deposition** with spiral upward **electrolyte** flow comprising external cathode body)

IT **Fluoropolymers**, uses
RL: NUU (Other use, unclassified); USES (Uses)
(**electrolytic cell** for metal **deposition** with spiral upward **electrolyte** flow comprising protecting net from metal with insulating **coatings** from)

IT Flow
(**electrolytic cell** for metal **deposition** with spiral upward **electrolyte** flow.)

IT titanium alloy, base
RL: NUU (Other use, unclassified); USES (Uses)
(**electrolytic cell** for metal **deposition** with spiral upward **electrolyte** flow comprising protecting net from)

IT 7440-02-0, Nickel, processes 7440-48-4, Cobalt, processes 7440-50-8, Copper, processes 7440-66-6, Zinc, processes
RL: FMU (Formation, unclassified); PEP (Physical, engineering or chemical process); FORM (Formation, nonpreparative); PROC (Process)
(**electrolytic cell** for metal **deposition** with spiral upward **electrolyte** flow)

IT **12597-68-1, Stainless steel**, uses
RL: TEM (Technical or engineered material use); USES (Uses)
(**electrolytic cell** for metal **deposition**

with spiral upward **electrolyte** flow comp frombody)
IT 16833-27-5, Oxide
RL: CAT (Catalyst use); USES (Uses)
(**electrolytic cell** for metal **deposition**
with spiral upward **electrolyte** flow comprising anode
coated with catalyst)
IT 9002-84-0, **Polytetrafluoroethylene** 9002-86-2,
Polyvinylchloride 9002-88-4, Polyethylene
9003-07-0, **Polypropylene** 24937-79-9, **Polyvinylidene**
fluoride
RL: NUU (Other use, unclassified); USES (Uses)
(**electrolytic cell** for metal **deposition**
with spiral upward **electrolyte** flow comprising protecting net
from metal with insulating **coatings** from)
IT 7440-32-6, Titanium, uses
RL: NUU (Other use, unclassified); USES (Uses)
(with insulated **coatings; electrolytic cell**
for metal **deposition** with spiral upward **electrolyte**
flow comprising protecting net from)
IT **12597-68-1, Stainless steel,** uses
RL: TEM (Technical or engineered material use); USES (Uses)
(**electrolytic cell** for metal **deposition**
with spiral upward **electrolyte** flow comp frombody)
RN 12597-68-1 HCAPLUS
CN Stainless steel (CA INDEX NAME)

*** STRUCTURE DIAGRAM IS NOT AVAILABLE ***
IT **9002-88-4, Polyethylene**
RL: NUU (Other use, unclassified); USES (Uses)
(**electrolytic cell** for metal **deposition**
with spiral upward **electrolyte** flow comprising protecting net
from metal with insulating **coatings** from)
RN 9002-88-4 HCAPLUS
CN Ethene, homopolymer (CA INDEX NAME)

CM 1

CRN 74-85-1
CMF C2 H4

$H_2C{=}CH_2$

RETABLE

Referenced Author (RAU)	Year (RPY)	VOL (RVL)	PG (RPG)	Referenced Work (RWK)	Referenced File
Heroguelle Yves	1987			US 4643819 A	HCAPLUS
Houseman Kenneth R	1984			US 4440616 A	HCAPLUS
Pohto Gerald R	1996			US 5584975 A	HCAPLUS

L93 ANSWER 2 OF 23 HCAPLUS COPYRIGHT 2007 ACS on STN
AN **2006:155437** HCAPLUS
DN 144:399880
TI Corrosion inhibition by **Nafion-polyaniline** composite
films **deposited** on **stainless steel** in a
two-step process
AU Sazou, D.; Kosseoglou, D.
CS Department of Chemistry, Aristotle University of Thessaloniki,

Thessaloniki, 54 124, Greece
SO Electrochimica Acta (2006), 51(12), 2503-2511
CODEN: ELCAAV; ISSN: 0013-4686
PB Elsevier B.V.
DT Journal
LA English
AB The inhibition of pitting corrosion of **stainless steel** (SS) is addressed in this paper by using a new type of anticorrosive **coatings** consisting of **Nafion-polyaniline** (PAn) composite films **electrodeposited** on **stainless steel** in a 2-step process. The anticorrosive strategy presented here is based on the interfacial modification of SS with a **Nafion** film, which as a cationic selective membrane prevents chloride ions to reach the SS **surface**. Chloride insertion to the composite **Nafion**-PAn film becomes less likely since **sulfonate** groups of the **Nafion** contribute to the charge compensation of PAn and therefore charge transport processes involve proton expulsion than anion insertion. **Nafion** films were pre-**deposited** at the **surface** of the SS **electrode** and the PAn films were formed on the SS|**Nafion electrode** by cyclic voltammetry in 0.5M H2SO4 **solns**. containing 0.1M aniline. Open circuit potential and potentiodynamic measurements were used for the evaluation of the corrosion protection properties of the **Nafion** -PAn composites.
CC 72-6 (Electrochemistry)
Section cross-reference(s): 35, 36, 42, 55
ST **Nafion polyaniline** composite anticorrosive **coating stainless steel**; aniline **electrochem polymn Nafion** modified **stainless steel**
IT Composites
(anticorrosive **coatings** from **Nafion-polyaniline** composites on **stainless steel**)
IT **Coating** materials
(anticorrosive; **Nafion-polyaniline** composites on **stainless steel**)
IT **Polyanilines**
RL: CPS (Chemical process); NUU (Other use, unclassified); PEP (Physical, engineering or chemical process); PNU (Preparation, unclassified); PREP (Preparation); PROC (Process); USES (Uses)
(**electrochem.** preparation on **stainless steel** and **Nafion**-modified **stainless steel** in H2SO4 **solution** and anticorrosive **coatings** of **Nafion-polyaniline** composites on **stainless steel**)
IT **Polymerization**
(**electrochem.**, oxidative; of aniline on **stainless steel** and **Nafion**-modified **stainless steel** in H2SO4 **solution** and anticorrosive **coatings** of **Nafion-polyaniline** composites on **stainless steel**)
IT Open circuit potential
(of **Nafion-polyaniline** composites on stainless in H2SO4-NaCl **solution**)
IT **Electrolytic** polarization
(of **Nafion-polyaniline** composites on **stainless steel** in H2SO4-NaCl **solution**)
IT **11109-50-5**, AISI 304 **66796-30-3**, **Nafion** 117
RL: CPS (Chemical process); DEV (Device component use); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)

(**electrochem. polymerization** of aniline on **stainless steel** and **Nafion**-modified **stainless steel** in H2SO4 **solution** and anticorrosive **coatings** of **Nafion-polyaniline** composites on **stainless steel**)

IT 7664-93-9, Sulfuric acid, uses
RL: NUU (Other use, unclassified); USES (Uses)
(**electrochem. polymerization** of aniline on **stainless steel** and **Nafion**-modified **stainless steel** in H2SO4 **solution** and anticorrosive **coatings** of **Nafion-polyaniline** composites on **stainless steel**)

IT 62-53-3, Aniline, reactions
RL: RCT (Reactant); RACT (Reactant or reagent)
(**electrochem. polymerization** on **stainless steel** and **Nafion**-modified **stainless steel** in H2SO4 **solution** and anticorrosive **coatings** of **Nafion-polyaniline** composites on **stainless steel**)

IT 25233-30-1P, **Polyaniline**
RL: CPS (Chemical process); NUU (Other use, unclassified); PEP (Physical, engineering or chemical process); PNU (Preparation, unclassified); PREP (Preparation); PROC (Process); USES (Uses)
(**electrochem.** preparation on **stainless steel** and **Nafion**-modified **stainless steel** in H2SO4 **solution** and anticorrosive **coatings** of **Nafion-polyaniline** composites on **stainless steel**)

IT 7647-14-5, Sodium chloride, processes
RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); PROC (Process)
(open-circuit potential and **electrolytic** polarization of **Nafion-polyaniline** composites on **stainless steel** in H2SO4-NaCl **solution**)

IT **11109-50-5**, AISI 304 **66796-30-3**, **Nafion** 117
RL: CPS (Chemical process); DEV (Device component use); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
(**electrochem. polymerization** of aniline on **stainless steel** and **Nafion**-modified **stainless steel** in H2SO4 **solution** and anticorrosive **coatings** of **Nafion-polyaniline** composites on **stainless steel**)

RN 11109-50-5 HCAPLUS
CN Iron alloy, base, Fe 66-74,Cr 18.00-20.00,Ni 8.00-10.50,Mn 0-2.00,Si 0-1.00,C 0-0.08,P 0-0.045,S 0-0.030 (UNS S30400) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Fe	66 - 74	7439-89-6
Cr	18.00 - 20.00	7440-47-3
Ni	8.00 - 10.50	7440-02-0
Mn	0 - 2.00	7439-96-5
Si	0 - 1.00	7440-21-3
C	0 - 0.08	7440-44-0
P	0 - 0.045	7723-14-0
S	0 - 0.030	7704-34-9

RN 66796-30-3 HCAPLUS
CN Nafion 117 (CA INDEX NAME)

*** STRUCTURE DIAGRAM IS NOT AVAILABLE ***

RETABLE

Referenced Author (RAU)	Year (RPY)	VOL (RVL)	PG (RPG)	Referenced Work (RWK)	Referenced File
Ahmad, N	1996	78	103	Synth Met	HCAPLUS
Alpatova, N	2002	38	913	Russ J Electrochem	HCAPLUS
Andreev, V	2001	37	605	Russ J Electrochem	HCAPLUS
Barthet, C	1995	388	35	J Electroanal Chem	HCAPLUS
Bernard, M	1999	146	995	J Electrochem Soc	HCAPLUS
Bojinov, M	1999	41	1557	Corros Sci	HCAPLUS
Camalet, J	1998	445	117	J Electroanal Chem	HCAPLUS
Camalet, J	1998	93	133	Synth Met	HCAPLUS
Camalet, J	1999	102	1386	Synth Met	HCAPLUS
Chadrasekhar, P	1999			Conducting Polymers,	
Cui, S	1999	105	91	Synth Met	HCAPLUS
DeBerry, D	1985	132	1022	J Electrochem Soc	HCAPLUS
de Souza, S	2001	4	B27	Electrochem Sol St L	HCAPLUS
Fahlman, M	1997	85	1323	Synth Met	HCAPLUS
Gierke, T	1981	19	1687	J Polym Sci	HCAPLUS
Heitner-Wirguin, C	1996	120	1	J Membr Sci	HCAPLUS
Hirai, T	1988	135	1132	J Electrochem Soc	HCAPLUS
Kraljic, M	2003	45	181	Corros Sci	
Lou, W	1995	40	667	Electrochim Acta	HCAPLUS
MacDiarmid, A	2002	125	11	Synth Met	HCAPLUS
McAndrew, P	1997	5	7	Trip	
Orata, D	1987	109	3574	J Am Chem Soc	HCAPLUS
Orata, D	1988	257	71	J Electroanal Chem	HCAPLUS
Patil, S	2004	225	204	Appl Surf Sci	HCAPLUS
Porat, Z	1993	140	2501	J Electrochem Soc	HCAPLUS
Sazou, D	1997	429	81	J Electroanal Chem	HCAPLUS
Sazou, D	2001	118	133	Synth Met	HCAPLUS
Sazou, D	2002	130	45	Synth Met	HCAPLUS
Sedrics, J	1996			Corrosion of Stainle	
Shim, Y	1990	137	538	J Electrochem Soc	HCAPLUS
Spinks, G	2002	6	57	J Sol St Electrochem	
Spinks, G	2002	6	85	J Sol St Electrochem	HCAPLUS
Varela, H	2001	122	321	Synth Met	HCAPLUS
Wang, J	2002	132	53	Synth Met	HCAPLUS
Wei, Y	1989	93	495	J Phys Chem	HCAPLUS
Wessling, B	1994	6	226	Adv Mater	HCAPLUS
Yue, J	1991	113	2665	J Am Chem Soc	HCAPLUS

L93 ANSWER 3 OF 23 HCAPLUS COPYRIGHT 2007 ACS on STN
AN 2005:408893 HCAPLUS
DN 142:449388
TI System and a method for manufacturing an **electrolyte** using **electro deposition**
IN **Punsalan, David; Herman, Gregory; Mardilovich, Peter**
PA USA
SO U.S. Pat. Appl. Publ., 13 pp.
CODEN: USXXCO
DT Patent
LA English
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	US 2005098438	A1	20050512	US 2003-705486	20031110 <--

PRAI US 2003-705486 20031110
AB A method of forming an **electrolyte** includes removably coupling a perimeter support to a temporary **substrate**, and **electrodepositing** an **electrolyte** composite film on the temporary **substrate**.
IC ICM **C25D0009-04**
INCL 205109000
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 36, 72
ST manuf **polymer electrolyte electrophoretic deposition**
IT **Polyoxyalkylenes, uses**
RL: NUU (Other use, unclassified); USES (Uses)
(**fluorine**- and **sulfo**-containing, **ionomers**; manufacturing **electrolyte** using **electrodeposition**)
IT **Electrodeposition**
(manufacturing **electrolyte** using)
IT **Electrolytes**
Electrophoretic deposition
Polymer electrolytes
(manufacturing **electrolyte** using **electrodeposition**)
IT **Fuel cells**
(manufacturing **electrolyte** using **electrodeposition** for)
IT Ceramics
(manufacturing **electrolyte** using **electrodeposition** for **fuel cell**, comprising)
IT **Fluoropolymers, uses**
RL: NUU (Other use, unclassified); USES (Uses)
(**polyoxyalkylene**-, **sulfo**-containing, **ionomers**; manufacturing **electrolyte** using **electrodeposition**)
IT **Ionomers**
RL: NUU (Other use, unclassified); USES (Uses)
(**polyoxyalkylenes**, **fluorine**- and **sulfo**-containing; manufacturing **electrolyte** using **electrodeposition**)
IT Ion exchange membranes
(proton; manufacturing **electrolyte** using **electrodeposition** for **fuel cell** with)
IT 7440-02-0, Nickel, uses **12597-68-1, Stainless steel**, uses
RL: DEV (Device component use); USES (Uses)
(temporary **electrode** in manufacturing **electrolyte** using **electrodeposition**)
IT **12597-68-1, Stainless steel**, uses
RL: DEV (Device component use); USES (Uses)
(temporary **electrode** in manufacturing **electrolyte** using **electrodeposition**)
RN 12597-68-1 HCAPLUS
CN Stainless steel (CA INDEX NAME)

*** STRUCTURE DIAGRAM IS NOT AVAILABLE ***

L93 ANSWER 4 OF 23 HCAPLUS COPYRIGHT 2007 ACS on STN
AN 2005:50884 HCAPLUS
DN 142:138321
TI A system and a method for manufacturing a **fuel-cell electrolyte** using **electrodeposition**
IN **Punsalan, David; Mardilovich, Peter; Herman, Gregory S.**
PA **Hewlett-Packard Development Company, L.P., USA**

SO Eur. Pat. Appl., 17 pp.
CODEN: EPXXDW
DT **Patent**
LA English
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	EP 1498976	A2	20050119	EP 2004-253574	20040615 <--
	EP 1498976	A3	20061025		
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR, BG, CZ, EE, HU, PL, SK, HR				
	US 2005014050	A1	20050120	US 2003-620675	20030715 <--
	JP 2005038858	A	20050210	JP 2004-208178	20040715 <--
PRAI	US 2003-620675	A	20030715 <--		

AB A method for manufacturing an **electrolyte** includes coupling a **substrate** to a charged **electrode** and **electrodepositing** a **polymeric electrolyte** on the **substrate.**
IC ICM **H01M0008-10**
ICS **C25D0015-02; C25D0009-08**
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 72
ST **fuel cell electrolyte** manuf **electrodeposition**
IT **Ionomers**
RL: DEV (Device component use); USES (Uses)
(**fluoropolymers, sulfo**-containing; system and method for manufacturing **fuel-cell electrolyte** using **electrodeposition**)
IT **Fluoropolymers, uses**
RL: DEV (Device component use); USES (Uses)
(**ionomers, sulfo**-containing; system and method for manufacturing **fuel-cell electrolyte** using **electrodeposition**)
IT **Electrodeposition**
Fuel cell electrolytes
Polymer electrolytes
(system and method for manufacturing **fuel-cell electrolyte** using **electrodeposition**)

L93 ANSWER 5 OF 23 HCAPLUS COPYRIGHT 2007 ACS on STN
AN 2004:203498 HCAPLUS
DN 140:244631
TI Method and apparatus for forming high **surface** area material films and membranes
IN Gore, Makarand P.; Dunfield, John Stephen
PA **Hewlett-Packard Development Company, L.P., USA**
SO U.S. Pat. Appl. Publ., 12 pp.
CODEN: USXXCO
DT **Patent**
LA English
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	US 2004048466	A1	20040311	US 2002-236429	20020906 <--
	US 6946362	B2	20050920		
	EP 1400330	A1	20040324	EP 2003-255246	20030822 <--
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR, BG, CZ, EE, HU, SK				
	JP 2004103587	A	20040402	JP 2003-315506	20030908 <--

US 2005112333 A1 20050526 US 2004-977735 20041029 <--
PRAI US 2002-236429 A 20020906 <--
AB The present invention discloses a method and apparatus for producing high **surface** area material films and membranes on **substrates**. In 1 application, patterns of spikes or bristles are produced on wafers and transferred to films, such as **conductive polymer** or metal films, by using repetitive and inexpensive processes, such as **electroplating** and embossing. Such a technique provides low cost, high **surface** area materials and allows reuse of expensive patterned Si. Membranes with high **surface** area are extremely valuable in **fuel cells** since the power d. is generally proportional to the **surface** area and the patterns may be used to cast inexpensive **fuel cell electrodes**.
IC ICM H01L0021-00
INCL 438680000; 438001000; 438455000; 438778000; 438964000
CC 76-2 (Electric Phenomena)
Section cross-reference(s): 52
ST high **surface** area membrane **fuel cell** **electrode**
IT **Polyoxyalkylenes, uses**
RL: DEV (Device component use); USES (Uses)
(**fluorine-** and **sulfo**-containing, **ionomers**; method and apparatus for forming high **surface** area material films and membranes)
IT **Conducting polymers**
Electrodeposition
Embossing
Fuel cell electrodes
Membranes, nonbiological
(method and **apparatus** for forming high **surface** area material films and membranes)
IT Amino acids, uses
Antibodies and Immunoglobulins
Carbohydrates, uses
DNA
Enzymes, uses
Lipids, uses
Proteins
RNA
RL: DEV (Device component use); USES (Uses)
(method and apparatus for forming high **surface** area material films and membranes)
IT **Coating** materials
(passivating; method and apparatus for forming high **surface** area material films and membranes)
IT **Fluoropolymers, uses**
RL: DEV (Device component use); USES (Uses)
(**polyoxyalkylene-**, **sulfo**-containing, **ionomers**; method and apparatus for forming high **surface** area material films and membranes)
IT **Ionomers**
RL: DEV (Device component use); USES (Uses)
(**polyoxyalkylenes**, **fluorine-** and **sulfo**-containing; method and apparatus for forming high **surface** area material films and membranes)
IT 7439-89-6, Iron, uses 7440-02-0, Nickel, uses 7440-04-2, Osmium, uses 7440-05-3, Palladium, uses 7440-06-4, **Platinum**, uses 7440-15-5, Rhenium, uses 7440-16-6, Rhodium, uses 7440-18-8, Ruthenium, uses 7440-33-7, Tungsten, uses 7440-48-4, Cobalt, uses
RL: DEV (Device component use); USES (Uses)

(method and apparatus for forming high **surface** area material films and membranes)

L93 ANSWER 6 OF 23 HCAPLUS COPYRIGHT 2007 ACS on STN
AN 2004:119828 HCAPLUS
DN 140:149214
TI Metal **coated polymer electrolyte** membrane having a reinforcement structure for **electrochemical** devices
IN Pan, Alfred I-tsung; Jeon, Yoocham
PA **Hewlett-Packard Development Company, L.P., USA**
SO U.S. Pat. Appl. Publ., 11 pp.
CODEN: USXXCO
DT **Patent**
LA English
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	US 2004028973	A1	20040212	US 2002-212720	20020807 <--
	US 6977009	B2	20051220		
	WO 2004015804	A2	20040219	WO 2003-US24649	20030807 <--
	WO 2004015804	A3	20050210		

W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA, ZM, ZW
RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
	AU 2003258122	A1	20040225	AU 2003-258122	20030807 <--
	EP 1527495	A2	20050504	EP 2003-784962	20030807 <--

R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR, BG, CZ, EE, HU, SK

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
	JP 2005535098	T	20051117	JP 2004-527800	20030807 <--
	US 2006027101	A1	20060209	US 2005-250051	20051012 <--
PRAI	US 2002-212720	A	20020807 <--		
	WO 2003-US24649	W	20030807		

AB A metal-**coated**, wire-reinforced **polymer electrolyte** membrane that is permeable only to protons and hydrogen is disclosed. The metal-**coated**, wire-reinforced **polymer electrolyte** membrane has a **surface** microstructure that prevents cracking of the metal **coating** during hydration. The metal-**coated**, wire-reinforced **polymer electrolyte** membrane can be used in liquid-type **fuel cells** to prevent crossover of fuel, gas and impurities.
IC ICM **H01M0008-10**
ICS **H01M0004-86; H01M0004-92**
INCL 429030000; X42-9 4.4
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38, 72
ST **electrochem** device metal **coated polymer electrolyte** membrane; **fuel cell** metal **coated polymer electrolyte** membrane
IT **Polyamides, uses**
Polyketones
RL: DEV (Device component use); USES (Uses)
(aromatic, **sulfonated**; metal **coated polymer**

electrolyte membrane having reinforcement structure for **electrochem.** devices)
IT Alloys, uses
RL: TEM (Technical or engineered material use); USES (Uses)
(film; metal **coated polymer electrolyte** membrane having reinforcement structure for **electrochem.** devices)
IT **Polyoxyalkylenes, uses**
RL: DEV (Device component use); USES (Uses)
(**fluorine-** and **sulfo**-containing, **ionomers**; metal **coated polymer electrolyte** membrane having reinforcement structure for **electrochem.** devices)
IT Catalysts
Electrochemical cells
Polymer electrolytes
(metal **coated polymer electrolyte** membrane having reinforcement structure for **electrochem.** devices)
IT **Polymer blends**
RL: DEV (Device component use); USES (Uses)
(metal **coated polymer electrolyte** membrane having reinforcement structure for **electrochem.** devices)
IT **Polyketones**
RL: DEV (Device component use); USES (Uses)
(**polyether-, sulfonated**; metal **coated polymer electrolyte** membrane having reinforcement structure for **electrochem.** devices)
IT **Polyethers, uses**
RL: DEV (Device component use); USES (Uses)
(**polyketone-, sulfonated**; metal **coated polymer electrolyte** membrane having reinforcement structure for **electrochem.** devices)
IT **Fluoropolymers, uses**
RL: DEV (Device component use); USES (Uses)
(**polyoxyalkylene-, sulfo**-containing, **ionomers**; metal **coated polymer electrolyte** membrane having reinforcement structure for **electrochem.** devices)
IT **Ionomers**
RL: DEV (Device component use); USES (Uses)
(**polyoxyalkylenes, fluorine-** and **sulfo**-containing; metal **coated polymer electrolyte** membrane having reinforcement structure for **electrochem.** devices)
IT **Polyquinoxalines**
RL: DEV (Device component use); USES (Uses)
(**polyphenylquinoxalines, sulfonated**; metal **coated polymer electrolyte** membrane having reinforcement structure for **electrochem.** devices)
IT **Fuel cells**
(solid **electrolyte**; metal **coated polymer electrolyte** membrane having reinforcement structure for **electrochem.** devices)
IT **Polybenzimidazoles**
Polybenzoxazoles
Polyimides, uses
Polymers, uses
Polyoxyphenylenes
Polysulfones, uses

Polythiophenylenes
RL: DEV (Device component use); USES (Uses)
(**sulfonated**; metal **coated polymer electrolyte** membrane having reinforcement structure for **electrochem**. devices)

IT 7439-89-6, Iron, uses 7440-00-8, Neodymium, uses 7440-05-3, Palladium, uses 7440-06-4, **Platinum**, uses 7440-25-7, Tantalum, uses 7440-62-2, Vanadium, uses 11107-69-0
RL: TEM (Technical or engineered material use); USES (Uses)
(film; metal **coated polymer electrolyte** membrane having reinforcement structure for **electrochem**. devices)

IT 25190-62-9D, **Poly**(1,4-phenylene), **sulfonated**
RL: DEV (Device component use); USES (Uses)
(metal **coated polymer electrolyte** membrane having reinforcement structure for **electrochem**. devices)

IT 31694-16-3, Peek 60015-03-4, Peekk 60015-05-6, Pekekk
RL: DEV (Device component use); USES (Uses)
(**sulfonated**; metal **coated polymer electrolyte** membrane having reinforcement structure for **electrochem**. devices)

RETABLE

Referenced Author (RAU)	Year (RPY)	VOL (RVL)	PG (RPG)	Referenced Work (RWK)	Referenced File
Abe	1987			US 4689150 A	HCAPLUS
Anon	1996			WO 9629752	HCAPLUS
Baker	1989			US 4857080 A	HCAPLUS
Breault	2005			US 6841283 B2	HCAPLUS
Cabot	1999		25	Journal of New Mater	
Edlund	1997			US 5645626 A	HCAPLUS
Formato	2001			US 6248469 B1	HCAPLUS
Gryaznov	1979			US 4132668 A	
Hamasaki	1998			US 5830261 A	HCAPLUS
Hockaday	1997			US 5631099 A	HCAPLUS
Hockaday	1998			US 5759712 A	HCAPLUS
Inoue, H		145	13	Journal of The Elect	
Lucero	1969			US 3468781 A	HCAPLUS
Ogawa	1998			US 5782960 A	HCAPLUS
Ohsawa	1993			US 5225296 A	HCAPLUS
Sanders	1981			US 4254086 A	HCAPLUS
Scheil	1979			US 4134742 A	HCAPLUS
Sirinyan	1989			US 4804475 A	HCAPLUS
Thornton	2002			US 6475268 B2	HCAPLUS
Tu	1998	43	373	Electrochimica Acta	
Warszawski	1975			US 3902916 A	HCAPLUS

L93 ANSWER 7 OF 23 HCAPLUS COPYRIGHT 2007 ACS on STN
AN **2003:935073** HCAPLUS
DN 140:393365
TI Tungsten carbide-supported **platinum**-lead catalysts as **porous electrodes** for methanol **fuel cells** manufacture
IN Shen, Peikang
PA Zhongshan University, Peop. Rep. China
SO Faming Zhuanli Shenqing Gongkai Shuomingshu, 9 pp.
CODEN: CNXXEV
DT **Patent**
LA Chinese

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	CN 1385914	A	20021218	CN 2002-115378	20020614 <--
PRAI	CN 2002-115378		20020614 <--		

AB A **porous** catalytic **electrode** for methanol **fuel cells** consists of nanometer-sized or micron-sized WC, C, or an oxide of Si, Pb, W, Sn, or Al, and a catalytic active material (e.g., a Pt group metal or alloy, porphyrin, phthalocyanine, rare earth metal, or transition metal) is **deposited** by constant-current **electrochem**. reduction on a a **substrate** selected from Au, Pt, Ti, Ag (or alloys), **stainless steel**, hard Al alloy, carbon paper, carbon fibers, or ITO **conductive** glass. Pt/WO3 **electrode** is fabricated by constant-current **electrochem**. reduction in a 30% aqueous isopropanol **solution** containing 50 mM W and 4-8 mM Pt (prepared from Pt black) under constant currents. Pt/Pb/PbxOy **electrode** is prepared by: (1) preparation of a **Nafion** suspension containing Pb(NO3)2, HClO4, NaF, and MeOH, (2) anodization at 20 mA/cm for 3 min to **deposit** Pb oxide, and (3) **electrolysis** in aqueous **chloroplatinic** acid at cathodic currents 0.2 mA/cm2 for 2 min. Pt/Ru/WO3 **electrode** is prepared by **electrochem**. reduction in a **solution** containing W, **chloroplatinic** acid, and RuO2 at -0.15 V (vs. SEC) for 30 min.

IC ICM **H01M0004-86**
ICS **H01M0004-88**

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST methanol **fuel cell** catalytic **electrode** manuf; **platinum** lead tungsten carbide **electrode** methanol **fuel cell**

IT Carbon fibers, uses
RL: DEV (Device component use); USES (Uses)
(catalyst **substrate**; tungsten carbide-supported **platinum**-lead catalysts as **porous electrodes** for methanol **fuel cells**)

IT Porphyrins
Rare earth metals, uses
Transition metals, uses
RL: DEV (Device component use); USES (Uses)
(catalyst support; tungsten carbide-supported **platinum**-lead catalysts as **porous electrodes** for methanol **fuel cells**)

IT **Polyoxyalkylenes, uses**
RL: DEV (Device component use); USES (Uses)
(**fluorine**- and **sulfo**-containing, **ionomers**, **electrodes**; tungsten carbide-supported **platinum**-lead catalysts as **porous electrodes** for methanol **fuel cells**)

IT **Fluoropolymers, uses**
RL: DEV (Device component use); USES (Uses)
(**polyoxyalkylene**-, **sulfo**-containing, **ionomers**, **electrodes**; tungsten carbide-supported **platinum**-lead catalysts as **porous electrodes** for methanol **fuel cells**)

IT **Ionomers**
RL: DEV (Device component use); USES (Uses)
(**polyoxyalkylenes**, **fluorine**- and **sulfo**-containing, **electrodes**; tungsten carbide-supported **platinum**-lead catalysts as **porous electrodes** for methanol **fuel cells**)

IT **Fuel cell** anodes

Fuel cell cathodes
Fuel cell electrodes
(tungsten carbide-supported **platinum**-lead catalysts as **porous electrodes** for methanol **fuel cells**)

IT **Platinum**-group metals
RL: CAT (Catalyst use); DEV (Device component use); USES (Uses)
(tungsten carbide-supported **platinum**-lead catalysts as **porous electrodes** for methanol **fuel cells**)

IT **Platinum** alloy, base
RL: CAT (Catalyst use); DEV (Device component use); USES (Uses)
(tungsten carbide-supported **platinum**-lead catalysts as **porous electrodes** for methanol **fuel cells**)

IT 7440-22-4, Silver, uses 7440-32-6, Titanium, uses 7440-57-5, Gold, uses **12597-68-1, Stainless steel**, uses
RL: DEV (Device component use); USES (Uses)
(catalyst **substrate**; tungsten carbide-supported **platinum**-lead catalysts as **porous electrodes** for methanol **fuel cells**)

IT 574-93-6, Phthalocyanine
RL: DEV (Device component use); USES (Uses)
(catalyst support; tungsten carbide-supported **platinum**-lead catalysts as **porous electrodes** for methanol **fuel cells**)

IT 1314-35-8, Tungsten oxide (WO3), uses 1332-29-2, Tin oxide 1335-25-7, Lead oxide 7439-92-1, Lead, uses 7440-06-4, **Platinum**, uses 7440-18-8, Ruthenium, uses
RL: CAT (Catalyst use); DEV (Device component use); USES (Uses)
(tungsten carbide-supported **platinum**-lead catalysts as **porous electrodes** for methanol **fuel cells**)

IT 67-56-1, Methanol, processes
RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); PROC (Process)
(tungsten carbide-supported **platinum**-lead catalysts as **porous electrodes** for methanol **fuel cells**)

IT **12597-68-1, Stainless steel**, uses
RL: DEV (Device component use); USES (Uses)
(catalyst **substrate**; tungsten carbide-supported **platinum**-lead catalysts as **porous electrodes** for methanol **fuel cells**)

RN 12597-68-1 HCAPLUS
CN Stainless steel (CA INDEX NAME)

*** STRUCTURE DIAGRAM IS NOT AVAILABLE ***

L93 ANSWER 8 OF 23 HCAPLUS COPYRIGHT 2007 ACS on STN
AN 2003:699624 HCAPLUS
DN 140:114082
TI A modified **Nafion** membrane with in situ **polymerized polypyrrole** for the direct methanol **fuel cell**
AU Smit, M. A.; Ocampo, A. L.; Espinosa-Medina, M. A.; Sebastian, P. J.
CS Centro de Investigacion en Energia (CIE), Temixco, UNAM, Morelos, 62580, Mex.
SO Journal of Power Sources (**2003**), 124(1), 59-64
CODEN: JPSODZ; ISSN: 0378-7753
PB Elsevier Science B.V.

DT Journal
LA English
AB **Nafion** membranes were modified by the in situ **electrodeposition** of **polypyrrole** inside the membrane **pores** and on the anode side only, to prevent the cross-over of methanol in the direct methanol **fuel cell** (DMFC). Pretreated **Nafion** membranes were 1st immersed in 0.1M sulfuric acid containing the pyrrole monomer and subsequently removed from this **solution** and placed in a two-**electrode** solid-state **electrochem. cell**, where the **polypyrrole** was formed galvanostatically. The modified membranes were studied in terms of morphol., **electrochem.** characteristics and methanol permeability. FTIR and SEM confirmed the presence of the **polypyrrole** on the anode side of the **Nafion** membrane. SEM shows the **polymer** to be present both on the membrane **surface** and inside the membrane **pores**. It is **deposited** as small grains, with two distinct sizes, the smallest particles have a diameter of .apprx.100 nm, while the larger particles have diams. of .apprx.700 nm. Methanol permeability was determined **electrochem.** and is effectively reduced. Cyclic voltammetry (CV) was performed in sulfuric acid, in pure methanol and in 50 volume % Methanol. The untreated **Nafion** membrane showed CV curves which were similar in all **electrolytes** with **electroactivity** only at the extreme ends of the curve. The **Nafion**/Ppy membrane showed typical **polypyrrole** curves, with current densities lowest in sulfuric acid, and highest in the 50 volume % Methanol, resp. For the methanol containing **electrolytes**, an addnl. oxidative peak appears in the CV, which may be related to **electrocatalytic** activity of the **polypyrrole** for methanol oxidation
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 35, 36, 38, 76
ST **Nafion** membrane **electropolymerized polypyrrole** composite methanol **fuel cell** voltammetry
IT Membranes, nonbiological
(**elec. conductive**; modified **Nafion** membrane with in situ **polymerized polypyrrole** for direct methanol **fuel cell** and modification of methanol permeability)
IT **Electrodeposition**
(**electropolymn.**; modified **Nafion** membrane with in situ **polymerized polypyrrole** for direct methanol **fuel cell** and modification of methanol permeability)
IT Current density
Cyclic voltammetry
Fuel cell separators
Polymer electrolytes
(modified **Nafion** membrane with in situ **polymerized polypyrrole** for direct methanol **fuel cell** and modification of methanol permeability)
IT Particle size
(of PPy grains on and inside **pores** of composite membrane; modified **Nafion** membrane with in situ **polymerized polypyrrole** for direct methanol **fuel cell** and modification of methanol permeability)
IT **Electric** current-potential relationship
(of assembled **fuel cells**; modified **Nafion** membrane with in situ **polymerized polypyrrole** for direct methanol **fuel cell** and modification of methanol permeability)
IT **Polymer morphology**

(of **electropolymd. polypyrrole** blends with **Nafion**; modified **Nafion** membrane with in situ **polymerized polypyrrole** for direct methanol **fuel cell** and modification of methanol permeability)

IT Permeability
(of membranes to methanol as determined by **fuel cell** current-voltage behavior; modified **Nafion** membrane with in situ **polymerized polypyrrole** for direct methanol **fuel cell** and modification of methanol permeability)

IT Carbon fibers, uses
RL: DEV (Device component use); USES (Uses)
(paper, **electrode** between membranes; modified **Nafion** membrane with in situ **polymerized polypyrrole** for direct methanol **fuel cell** and modification of methanol permeability)

IT 30604-81-0P, **Polypyrrole**
RL: DEV (Device component use); PRP (Properties); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)
(composite with **Nafions**; modified **Nafion** membrane with in situ **polymerized polypyrrole** for direct methanol **fuel cell** and modification of methanol permeability)

IT **66796-30-3, Nafion**-117
RL: DEV (Device component use); PRP (Properties); USES (Uses)
(composites with **electropolymd. polypyrrole**; modified **Nafion** membrane with in situ **polymerized polypyrrole** for direct methanol **fuel cell** and modification of methanol permeability)

IT **77950-55-1P, Nafion**-115
RL: DEV (Device component use); PRP (Properties); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)
(composites with **electropolymd. polypyrrole**; modified **Nafion** membrane with in situ **polymerized polypyrrole** for direct methanol **fuel cell** and modification of methanol permeability)

IT **12597-68-1, Stainless steel**, uses
RL: DEV (Device component use); USES (Uses)
(**electrodes**; modified **Nafion** membrane with in situ **polymerized polypyrrole** for direct methanol **fuel cell** and modification of methanol permeability)

IT 7664-93-9, Sulfuric acid, uses
RL: DEV (Device component use); USES (Uses)
(modified **Nafion** membrane with in situ **polymerized polypyrrole** for direct methanol **fuel cell** and modification of methanol permeability)

IT 109-97-7, Pyrrole
RL: PEP (Physical, engineering or chemical process); PYP (Physical process); RCT (Reactant); PROC (Process); RACT (Reactant or reagent)
(modified **Nafion** membrane with in situ **polymerized polypyrrole** for direct methanol **fuel cell** and modification of methanol permeability)

IT 67-56-1, Methanol, uses
RL: PRP (Properties); TEM (Technical or engineered material use); USES (Uses)
(modified **Nafion** membrane with in situ **polymerized polypyrrole** for direct methanol **fuel cell** and modification of methanol permeability)

IT **66796-30-3, Nafion**-117
RL: DEV (Device component use); PRP (Properties); USES (Uses)
(composites with **electropolymd. polypyrrole**;

modified **Nafion** membrane with in situ **polymerized**
polypyrrole for direct methanol **fuel cell**
and modification of methanol permeability)
RN 66796-30-3 HCAPLUS
CN Nafion 117 (CA INDEX NAME)

*** STRUCTURE DIAGRAM IS NOT AVAILABLE ***
IT **77950-55-1P, Nafion**-115
RL: DEV (Device component use); PRP (Properties); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)
(composites with **electropolymd. polypyrrole;**
modified **Nafion** membrane with in situ **polymerized**
polypyrrole for direct methanol **fuel cell**
and modification of methanol permeability)
RN 77950-55-1 HCAPLUS
CN Nafion 115 (CA INDEX NAME)

*** STRUCTURE DIAGRAM IS NOT AVAILABLE ***
IT **12597-68-1, Stainless steel,** uses
RL: DEV (Device component use); USES (Uses)
(**electrodes;** modified **Nafion** membrane with in situ
polymerized polypyrrole for direct methanol **fuel**
cell and modification of methanol permeability)
RN 12597-68-1 HCAPLUS
CN Stainless steel (CA INDEX NAME)

*** STRUCTURE DIAGRAM IS NOT AVAILABLE ***
RETABLE

Referenced Author (RAU)	Year (RPY)	VOL (RVL)	PG (RPG)	Referenced Work (RWK)	Referenced File
Arimura, T	1999	118	1	Solid State Ionics	HCAPLUS
Bose, C	1992	333	235	J Electroanal Chem	HCAPLUS
Burstein, G	1997	38	425	Catal Today	HCAPLUS
Chang, C	1995	300	15	Anal Chim Acta	HCAPLUS
Chen, C	1993	350	161	J Electroanal Chem	HCAPLUS
de Bruyne, A	1998	99	118	Surf Coatings Techno	HCAPLUS
Endres, F	1997	88	73	Synth Metals	HCAPLUS
Fusalba, F	1999	103	9044	J Phys Chem B	HCAPLUS
Hable, C	1993	9	3284	Langmuir	HCAPLUS
Hammache, H	2001	123	515	Synth Metals	HCAPLUS
Hong, L	1999	218	233	J Colloid Interfase	HCAPLUS
Jiang, R	2002	5	A156	Electrochem Solid St	HCAPLUS
Kulesza, P	1999	44	2131	Electrochim Acta	HCAPLUS
Lin, C	1998	55	139	Mater Chem Phys	HCAPLUS
Ludvigsson, M	2000	45	2267	Electrochim Acta	HCAPLUS
Musio, F	1997	41	97	Sens Actuators B	
Radhakrishnan, S	2001	341	518	Chem Phys Lett	HCAPLUS
Shigehara, K	1987	18	721	Synth Metals	HCAPLUS
Sundmacher, K	2001	56	333	Chem Eng Sci	HCAPLUS
Tazi, B	2000	45	4329	Electrochim Acta	HCAPLUS
Topart, P	1992	96	7824	J Phys Chem	HCAPLUS
Topart, P	1992	96	8662	J Phys Chem	HCAPLUS

L93 ANSWER 9 OF 23 HCAPLUS COPYRIGHT 2007 ACS on STN
AN **2003:667052** HCAPLUS
DN 139:354840
TI **Electrophoretic deposition** of zeolites
AU Depase, Edoardo; Talbot, Jan B.
CS Chemical Engineering Program, University of California, La Jolla, CA,

92093-0411, USA
SO Proceedings - Electrochemical Society (**2002**),
2002-21(Electrophoretic Deposition), 86-93
CODEN: PESODO; ISSN: 0161-6374
PB Electrochemical Society
DT Journal
LA English
AB The **electrophoretic deposition** of zeolite 3A films in
iso-Pr alc. onto aluminum disks and **stainless steel**
porous supports was investigated as a procedure for the preparation of
the supported membranes. The effects of the applied voltage and
deposition time on the **deposit** mass, film morphol. and
adhesion strength were studied. Post-**deposition** treatments,
such as baking of the **deposits** and **coating** with
Nafion, enhanced the adhesion strength of the films.
CC 66-4 (Surface Chemistry and Colloids)
Section cross-reference(s): 55, 56, 72, 78
ST **electrophoretic deposition** zeolite aluminum
stainless steel porous supports
IT Films
(**electrophoretic deposition** of zeolites 3A films in
iso-Pr alc. onto aluminum disks and **stainless steel**
porous supports)
IT Zeolite 3A
RL: PEP (Physical, engineering or chemical process); PYP (Physical
process); PROC (Process)
(**electrophoretic deposition** of zeolites 3A films in
iso-Pr alc. onto aluminum disks and **stainless steel**
porous supports)
IT Membranes, nonbiological
(**electrophoretic deposition** of zeolites 3A films in
iso-Pr alc. onto aluminum disks and **stainless steel**
porous supports for preparation of supported membranes)
IT **Electric** potential
(for **electrophoretic deposition** of zeolites 3A
films in iso-Pr alc. onto aluminum disks and **stainless**
steel porous supports)
IT Adhesion, physical
(of zeolites 3A films **electrophoretically deposited**
in iso-Pr alc. onto aluminum disks and **stainless**
steel porous supports)
IT **Coating** materials
Coating process
(of zeolites 3A films **electrophoretically deposited**
in iso-Pr alc. onto **stainless steel porous**
supports, with **Nafion**)
IT **Electrophoretic deposition**
(of zeolites 3A films in iso-Pr alc. onto aluminum disks and
stainless steel porous supports)
IT **Electrodes**
(**porous**; **electrophoretic deposition** of
zeolites 3A films in iso-Pr alc. onto aluminum disks and
stainless steel porous supports)
IT 7429-90-5, Aluminum, uses **12597-68-1, Stainless**
steel, uses
RL: DEV (Device component use); USES (Uses)
(**electrophoretic deposition** of zeolites 3A films in
iso-Pr alc. onto aluminum disks and **stainless steel**
porous supports)
IT 67-63-0, 2-Propanol, uses

RL: NUU (Other use, unclassified); USES (Uses)
(**electrophoretic deposition** of zeolites 3A films in iso-Pr alc. onto aluminum disks and **stainless steel porous** supports)

IT **66796-30-3**, **Nafion** 117
RL: NUU (Other use, unclassified); USES (Uses)
(of zeolites 3A films **electrophoretically deposited** in iso-Pr alc. onto **stainless steel porous** supports, with **Nafion**)

IT **12597-68-1**, **Stainless steel**, uses
RL: DEV (Device component use); USES (Uses)
(**electrophoretic deposition** of zeolites 3A films in iso-Pr alc. onto aluminum disks and **stainless steel porous** supports)

RN 12597-68-1 HCAPLUS
CN Stainless steel (CA INDEX NAME)

*** STRUCTURE DIAGRAM IS NOT AVAILABLE ***

IT **66796-30-3**, **Nafion** 117
RL: NUU (Other use, unclassified); USES (Uses)
(of zeolites 3A films **electrophoretically deposited** in iso-Pr alc. onto **stainless steel porous** supports, with **Nafion**)

RN 66796-30-3 HCAPLUS
CN Nafion 117 (CA INDEX NAME)

*** STRUCTURE DIAGRAM IS NOT AVAILABLE ***

RETABLE

Referenced Author (RAU)	Year (RPY)	VOL (RVL)	PG (RPG)	Referenced Work (RWK)	Referenced File
Ahlers, C	2000	45	3379	Electrochimica Acta	HCAPLUS
Ahlers, C	1999	146	3259	J Electrochem Soc	HCAPLUS
Aoki, K	2000	46	221	AIChE J	HCAPLUS
Aoki, K	1998	141	197	J Membrane Sci	HCAPLUS
Bakker, W	1996	117	57	J Membrane Sci	HCAPLUS
Bernal, M	2000	56	221	Catal Today	HCAPLUS
Geus, E	1993	1	131	J Membrane Sci	HCAPLUS
Jafar, J	1997	12	305	Microporous Mat	HCAPLUS
Jia, M	1993	82	15	J Membrane Sci	HCAPLUS
Keizer, K	1998	146	159	J Membrane Sci	
Kusakabe, K	1997	36	649	Ind Eng Chem Res	HCAPLUS
Kusakabe, K	1996	116	39	J Membrane Sci	HCAPLUS
Murray, C	1984	164	205	J Electroanal Chem	HCAPLUS
Russ, B	1998	68	257	J Adhesion	HCAPLUS
Russ, B	1998	145	1245	J Electrochem Soc	HCAPLUS
Seike, T	2002	12	366	J Mater Chem	HCAPLUS
Shane, M	1994	165	334	J Colloids and Inter	HCAPLUS
Suer, M	1994	91	77	J Membrane Sci	
Takayama, Y	1999	107	437	J Ceramic Soc Japan	
Tsapatsis, M	1999	24	30	MRS Bulletin	HCAPLUS
Yan, Y	1997	126	53	J Membrane Sci	HCAPLUS
Zhang, Y	1992	271	465	Better Ceramics Thro	HCAPLUS

L93 ANSWER 10 OF 23 HCAPLUS COPYRIGHT 2007 ACS on STN
AN **2003:124206** HCAPLUS
DN 138:313428
TI Improved **Electrodeposited** Iridium Oxide pH Sensor Fabricated on Etched Titanium **Substrates**
AU Marzouk, Sayed A. M.

CS Department of Chemistry Faculty of Science, United Arab Emirates
University, Al-Ain, United Arab Emirates
SO Analytical Chemistry (**2003**), 75(6), 1258-1266
CODEN: ANCHAM; ISSN: 0003-2700
PB American Chemical Society
DT Journal
LA English
AB The preparation and characterization of an improved solid-state pH sensor are described. The sensor is based on anodically **electrodeposited** iridium oxide film, as a pH-sensing layer. Merits of the present sensor include (i) excellent adhesion of the pH sensitive layer to the **substrate**, (ii) excellent reproducibility of sensor fabrication, (iii) faster preparation procedure, and (iv) low cost of the titanium **substrate**. These advantages are realized by combining acid-etched titanium as the **electrode substrate** with an optimized **electrodeposition solution** consisting of IrCl4 as an iridium source, hydrogen peroxide, potassium oxalate, and potassium carbonate. Heating the **electrodeposition solution** to 90° reduced the time required for **solution** development from .apprx.3 days to 10 min. The pH-sensing layer is protected with a layer of **Nafion** and a **microporous polyester** membrane. The improved sensor showed a super-Nernstian response (-73.7 ± 1.2 mV/pH unit) in the pH range of 1.5-11.5. The present pH sensor, fabricated in a tubular form, is used as a detector in a flow injection anal. (FIA) system for pH measurements. Optimization of the FIA exptl. parameters resulted in a linear dependence of peak heights on the pH of the injected samples in the pH range of 2-11.

CC 79-2 (Inorganic Analytical Chemistry)
Section cross-reference(s): 61

ST **electrodeposited** iridium oxide pH sensor fabrication etched titanium **substrate**

IT Flow injection analysis
(pH determination by flow injection anal. using improved **electrodeposited** iridium oxide pH sensor fabricated on etched titanium **substrates**)

IT **Electrodeposition**
Electronic device fabrication
Film **electrodes**
Microelectrodes
Sensors
pH
pH **electrodes**
(pH determination with improved **electrodeposited** iridium oxide pH sensor fabricated on etched titanium **substrates**)

IT Alloys, analysis
RL: ARU (Analytical role, unclassified); DEV (Device component use); ANST (Analytical study); USES (Uses)
(**substrate**; pH determination with improved **electrodeposited** iridium oxide pH sensor fabricated on etched titanium **substrates**)

IT 12030-49-8, Iridium oxide
RL: ARU (Analytical role, unclassified); CPS (Chemical process); DEV (Device component use); PEP (Physical, engineering or chemical process); ANST (Analytical study); PROC (Process); USES (Uses)
(pH determination with improved **electrodeposited** iridium oxide pH sensor fabricated on etched titanium **substrates**)

IT 584-08-7, Potassium carbonate 7722-84-1, Hydrogen peroxide, processes
10043-22-8, Potassium oxalate
RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); PROC (Process)

(pH determination with improved **electrodeposited** iridium oxide pH sensor fabricated on etched titanium **substrates**)

IT 10025-97-5, Iridium chloride ($IrCl_4$)
RL: RCT (Reactant); RACT (Reactant or reagent)
(pH determination with improved **electrodeposited** iridium oxide pH sensor fabricated on etched titanium **substrates**)

IT 7440-02-0, Nickel, analysis 7440-22-4, Silver, analysis 7440-32-6, Titanium, analysis 7440-33-7, Tungsten, analysis 7440-48-4, Cobalt, analysis 7440-50-8, Copper, analysis 7440-57-5, Gold, analysis 7440-67-7, Zirconium, analysis 11106-97-1 **12597-68-1**, **Stainless steel**, analysis 37286-21-8, Hastelloy
RL: ARU (Analytical role, unclassified); DEV (Device component use); ANST (Analytical study); USES (Uses)
(**substrate**; pH determination with improved **electrodeposited** iridium oxide pH sensor fabricated on etched titanium **substrates**)

IT **12597-68-1**, **Stainless steel**, analysis
RL: ARU (Analytical role, unclassified); DEV (Device component use); ANST (Analytical study); USES (Uses)
(**substrate**; pH determination with improved **electrodeposited** iridium oxide pH sensor fabricated on etched titanium **substrates**)

RN 12597-68-1 HCAPLUS
CN Stainless steel (CA INDEX NAME)

*** STRUCTURE DIAGRAM IS NOT AVAILABLE ***

RETABLE

Referenced Author (RAU)	Year (RPY)	VOL (RVL)	PG (RPG)	Referenced Work (RWK)	Referenced File
Alegret, S	1989	222	373	Anal Chim Acta	HCAPLUS
Ardizzone, S	1981	126	287	J Electroanal Chem	HCAPLUS
Baur, J	1998	443	208	J Electroanal Chem	HCAPLUS
Bezbaruah, A	2002	74	5726	Anal Chem	HCAPLUS
Dexter, S	2000	15	313	Biofouling	HCAPLUS
Donghong, W	2000	66	6	Sens Actuators, B	
Hauser, P	1989	221	139	Anal Chim Acta	HCAPLUS
Hitchman, M	1988	113	35	Analyst	HCAPLUS
Hongbo, C	1985	169	209	Anal Chim Acta	HCAPLUS
Izumiya, K	1998	43	3303	Electrochim Acta	HCAPLUS
Katsube, T	1982	2	399	Sens Actuators	HCAPLUS
Kinlen, P	1994	22	13	Sens Actuators, B	
Lee, I	2002	23	2375	Biomaterials	HCAPLUS
Lee, I	2002	23	2375	Biomaterials	HCAPLUS
Madsen, B	1987	59	127	Anal Chem	HCAPLUS
Marzouk, S	2002	308	52	Anal Biochem	HCAPLUS
Marzouk, S	1998	70	5054	Anal Chem	HCAPLUS
Meyer, R	2001	9	2	IEEE Eng Med Biol So	MEDLINE
Petit, M	1998	444	247	J Electroanal Chem	HCAPLUS
Ruzicka, J	1981			Flow Injection Analy	
Suzuki, H	1999	71	1737	Anal Chem	HCAPLUS
Suzuki, H	2000	405	57	Anal Chim Acta	HCAPLUS
van Staden, J	1986	111	1231	Analyst	HCAPLUS
Wang, M	2002	81	313	Sens Actuators, B	
Wang, M	2002	81	313	Sens Actuators, B	
Wipf, D	2000	72	4921	Anal Chem	HCAPLUS
Yamanaka, K	1989	28	632	Jpn J Appl Phys	HCAPLUS
Zampronio, C	2000	51	1163	Talanta	HCAPLUS
Zhang, J	1998	452	235	J Electroanal Chem	HCAPLUS

L93 ANSWER 11 OF 23 HCAPLUS COPYRIGHT 2007 ACS on STN
AN **2002:9883** HCAPLUS
DN 136:87852
TI **Polyelectrolyte-coated** permeable composite material,
method for producing the same and its use
IN Hying, Christian; Hoerpel, Gerhard; Tieke, Bernd; Krasemann, Lutz;
Toutianoush, Ali
PA Creavis Gesellschaft fuer Technologie und Innovation mbH, Germany
SO Eur. Pat. Appl., 18 pp.
CODEN: EPXXDW
DT **Patent**
LA German
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	EP 1166860	A2	20020102	EP 2001-114428	20010615 <--
	EP 1166860	A3	20020109		
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO				
	DE 10031281	A1	20020110	DE 2000-10031281	20000627 <--
	NO 2001003106	A	20011228	NO 2001-3106	20010621 <--
	JP 2002066277	A	20020305	JP 2001-192053	20010625 <--
	CA 2351747	A1	20011227	CA 2001-2351747	20010626 <--
	US 2002039648	A1	20020404	US 2001-891314	20010627 <--
PRAI	DE 2000-10031281	A	20000627 <--		

AB The membrane is prepared by forming a **polyelectrolyte** membrane layer on a perforated **substrate** made of an inorg. material, preferably a metal, transition metal, or a mixed metal with at least one Group III-VII element. The **polyelectrolyte** layer may be a **poly** allylamine hydrochloride, **polyethylenimine**, **polyvinyl** amine, a potassium salt of **polysulfate**, a sodium salt of **polystyrene sulfonate**, or **polyacrylamido**-2-methyl-1-**propanesulfonic** acid. The **substrate** may be a **stainless steel** mesh. The **polyelectrolyte-coated** composite is suitable for as a membrane in **fuel cell** or as a membrane in pervaporation or gas permeation or for separation of alc.-water mixts.,
especially
ethanol-water mixts.
IC ICM B01D0069-12
ICS B01D0071-02; B01D0067-00; B01D0061-36; B01D0053-22
CC 48-1 (Unit Operations and Processes)
ST membrane **polyelectrolyte coated** composite
IT **Fluoropolymers, reactions**
Polysulfones, reactions
RL: RCT (Reactant); RACT (Reactant or reagent)
(aminolyzed or **sulfonated; polyelectrolyte-coated** permeable composite material, method for producing the same and its use)
IT **Polyethers, reactions**
RL: RCT (Reactant); RACT (Reactant or reagent)
(**polyamide-**, aminolyzed or **sulfonated; polyelectrolyte-coated** permeable composite material, method for producing the same and its use)
IT Composites
Membranes, nonbiological
Polyelectrolytes
(**polyelectrolyte-coated** permeable composite material, method for producing the same and its use)
IT Bronsted acids

Fluoropolymers, reactions
Zeolites (synthetic), reactions
RL: RCT (Reactant); RACT (Reactant or reagent)
(**polyelectrolyte-coated** permeable composite
material, method for producing the same and its use)
IT **Polyamides, reactions**
RL: RCT (Reactant); RACT (Reactant or reagent)
(**polyether-**, aminolyzed or **sulfonated;**
polyelectrolyte-coated permeable composite material,
method for producing the same and its use)
IT **12597-68-1, Stainless steel**, uses
RL: DEV (Device component use); USES (Uses)
(**polyelectrolyte-coated** permeable composite
material, method for producing the same and its use)
IT 64-17-5P, Ethanol, reactions
RL: PUR (Purification or recovery); RCT (Reactant); PREP (Preparation);
RACT (Reactant or reagent)
(**polyelectrolyte-coated** permeable composite
material, method for producing the same and its use)
IT 78-10-4, Tetraethylorthosilicate 546-68-9, Titanium tetraisopropylate
1310-73-2, Sodium hydroxide, reactions 1344-28-1, Alumina, reactions
7429-90-5, Aluminum, reactions 7429-90-5D, Aluminum, alc. salts
7439-89-6, Iron, reactions 7439-93-2, Lithium, reactions 7439-95-4,
Magnesium, reactions 7439-96-5, Manganese, reactions 7439-98-7,
Molybdenum, reactions 7440-02-0, Nickel, reactions 7440-09-7,
Potassium, reactions 7440-21-3, Silicon, reactions 7440-23-5, Sodium,
reactions 7440-32-6, Titanium, reactions 7440-33-7, Tungsten,
reactions 7440-47-3, Chromium, reactions 7440-48-4, Cobalt, reactions
7440-50-8, Copper, reactions 7440-62-2, Vanadium, reactions
7440-62-2D, Vanadium, alc. salts 7440-65-5, Yttrium, reactions
7440-66-6, Zinc, reactions 7440-67-7, Zirconium, reactions 7440-70-2,
Calcium, reactions 7601-89-0 7647-01-0, Hydrochloric acid, reactions
7647-14-5, Sodium chloride, reactions 7697-37-2, Nitric acid, reactions
7722-64-7, Potassium permanganate 9002-84-0,
Polytetrafluoroethylene 13463-67-7, Titania, reactions
24937-79-9D, **Polyvinylidene fluoride**, aminolyzed or
sulfonated 26336-38-9, **Polyvinyl** amine 26837-42-3,
Polyvinyl sulfate, potassium salt 27119-07-9 68092-72-8
71550-12-4, **Poly**(allylamine hydrochloride) 260784-99-4, Silane
285
RL: RCT (Reactant); RACT (Reactant or reagent)
(**polyelectrolyte-coated** permeable composite
material, method for producing the same and its use)
IT **12597-68-1, Stainless steel**, uses
RL: DEV (Device component use); USES (Uses)
(**polyelectrolyte-coated** permeable composite
material, method for producing the same and its use)
RN 12597-68-1 HCAPLUS
CN Stainless steel (CA INDEX NAME)

*** STRUCTURE DIAGRAM IS NOT AVAILABLE ***

L93 ANSWER 12 OF 23 HCAPLUS COPYRIGHT 2007 ACS on STN
AN 2001:661755 HCAPLUS
DN 135:213483
TI Method of fabrication of gas diffusion **electrode** with nanosized
pores for **polymer electrolyte** membrane
fuel cells
IN Appley, A. John; Gamburzev, Sergei
PA The Texas A and M University System, USA

SO PCT Int. Appl., 70 pp.
CODEN: PIXXD2
DT **Patent**
LA English
FAN.CNT 3

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 2001065617	A2	20010907	WO 2001-US4486	20010209 <--
	WO 2001065617	A3	20020613		
	WO 2001065617	A9	20031002		

W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZW

RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
	US 2001031389	A1	20011018	US 2001-779868	20010208 <--
	US 6649299	B2	20031118		
	US 2001033956	A1	20011025	US 2001-779872	20010208 <--
	US 6770394	B2	20040803		
	AU 2001068024	A5	20010912	AU 2001-68024	20010209 <--
	US 2004241063	A1	20041202	US 2004-879341	20040629 <--
PRAI	US 2000-181893P	P	20000211 <--		
	US 2000-181894P	P	20000211 <--		
	US 2000-182010P	P	20000211 <--		
	US 2001-779868	A	20010208 <--		
	US 2000-181995P	P	20000211 <--		
	US 2000-182069P	P	20000211 <--		
	US 2001-779872	A3	20010208 <--		
	WO 2001-US4486	W	20010209 <--		

AB The title **electrode** contains an **electrocatalyst**, a **polymer electrolyte** and nanosized **pores**. The **pores** are formed using nanosized **pore**-formers. The **pore**-former is applied to a **substrate** along with a **polymer electrolyte** and an **electrocatalyst** and the resulting structure is treated to remove the **pore**-former.

IC **H01M0004-00**
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
ST **fuel cell** gas diffusion **electrode**
IT Catalysts
(**electrocatalysts**; method of fabrication of gas diffusion **electrode** with nanosized **pores** for **polymer electrolyte** membrane **fuel cells**)
IT Carbon fibers, uses
RL: TEM (Technical or engineered material use); USES (Uses)
(fabrics, **substrate**; method of fabrication of gas diffusion **electrode** with nanosized **pores** for **polymer electrolyte** membrane **fuel cells**)
IT **Polyoxyalkylenes, uses**
RL: DEV (Device component use); USES (Uses)
(**fluorine**- and **sulfo**-containing, **ionomers**; method of fabrication of gas diffusion **electrode** with nanosized **pores** for **polymer electrolyte** membrane **fuel cells**)
IT **Fuel cell electrodes**
(gas diffusion; method of fabrication of gas diffusion

electrode with nanosized **pores** for **polymer**
electrolyte membrane **fuel cells**)
IT **Polymer electrolytes**
Pore
(method of fabrication of gas diffusion **electrode** with
nanosized **pores** for **polymer electrolyte**
membrane **fuel cells**)
IT Carbon black, uses
RL: MOA (Modifier or additive use); USES (Uses)
(method of fabrication of gas diffusion **electrode** with
nanosized **pores** for **polymer electrolyte**
membrane **fuel cells**)
IT **Fluoropolymers**, uses
RL: TEM (Technical or engineered material use); USES (Uses)
(method of fabrication of gas diffusion **electrode** with
nanosized **pores** for **polymer electrolyte**
membrane **fuel cells**)
IT Graphitized carbon black
RL: TEM (Technical or engineered material use); USES (Uses)
(method of fabrication of gas diffusion **electrode** with
nanosized **pores** for **polymer electrolyte**
membrane **fuel cells**)
IT **Fluoropolymers**, uses
RL: TEM (Technical or engineered material use); USES (Uses)
(**perfluoroalkoxy**; method of fabrication of gas diffusion
electrode with nanosized **pores** for **polymer**
electrolyte membrane **fuel cells**)
IT **Sulfonic** acids, uses
RL: TEM (Technical or engineered material use); USES (Uses)
(**perfluorosulfonic** acid **polymers**, membrane; method
of fabrication of gas diffusion **electrode** with nanosized
pores for **polymer electrolyte** membrane
fuel cells)
IT **Fuel cells**
(**polymer electrolyte** membrane; method of
fabrication of gas diffusion **electrode** with nanosized
pores for **polymer electrolyte** membrane
fuel cells)
IT **Fluoropolymers, uses**
RL: DEV (Device component use); USES (Uses)
(**polyoxyalkylene-**, **sulfo**-containing, **ionomers**
; method of fabrication of gas diffusion **electrode** with
nanosized **pores** for **polymer electrolyte**
membrane **fuel cells**)
IT **Ionomers**
RL: DEV (Device component use); USES (Uses)
(**polyoxyalkylenes**, **fluorine-** and **sulfo**
-containing; method of fabrication of gas diffusion **electrode**
with nanosized **pores** for **polymer**
electrolyte membrane **fuel cells**)
IT Metals, uses
RL: TEM (Technical or engineered material use); USES (Uses)
(**porous**, **substrate**; method of fabrication of gas
diffusion **electrode** with nanosized **pores** for
polymer electrolyte membrane **fuel**
cells)
IT **Fluoropolymers, uses**
Fluoropolymers, uses
RL: TEM (Technical or engineered material use); USES (Uses)
(**sulfo**-containing, membrane; method of fabrication of gas

diffusion **electrode** with nanosized **pores** for
polymer electrolyte membrane **fuel**
cells)
IT 7440-57-5, Gold, uses
RL: TEM (Technical or engineered material use); USES (Uses)
(Al **plated** with; method of fabrication of gas diffusion
electrode with nanosized **pores** for **polymer**
electrolyte membrane **fuel cells**)
IT 11116-16-8, Titanium nitride
RL: TEM (Technical or engineered material use); USES (Uses)
(**coating**; method of fabrication of gas diffusion
electrode with nanosized **pores** for **polymer**
electrolyte membrane **fuel cells**)
IT 7631-86-9, Fumed silica, uses
RL: TEM (Technical or engineered material use); USES (Uses)
(colloidal, **pore** former; method of fabrication of gas
diffusion **electrode** with nanosized **pores** for
polymer electrolyte membrane **fuel**
cells)
IT 91033-96-4
RL: CAT (Catalyst use); USES (Uses)
(method of fabrication of gas diffusion **electrode** with
nanosized **pores** for **polymer electrolyte**
membrane **fuel cells**)
IT 7440-06-4, **Platinum**, uses
RL: CAT (Catalyst use); DEV (Device component use); USES (Uses)
(method of fabrication of gas diffusion **electrode** with
nanosized **pores** for **polymer electrolyte**
membrane **fuel cells**)
IT **163294-14-2, nafion** 112
RL: DEV (Device component use); USES (Uses)
(method of fabrication of gas diffusion **electrode** with
nanosized **pores** for **polymer electrolyte**
membrane **fuel cells**)
IT 7440-31-5, Tin, uses 9002-84-0, Ptfe **12597-68-1,**
stainless steel, uses 24937-79-9, Pvdf 25067-11-2,
Perfluoroethylene-perfluoropropylene copolymer
190673-42-8, Gore-select
RL: TEM (Technical or engineered material use); USES (Uses)
(method of fabrication of gas diffusion **electrode** with
nanosized **pores** for **polymer electrolyte**
membrane **fuel cells**)
IT 7429-90-5, Aluminum, uses 7440-02-0, Nickel, uses 7440-32-6, Titanium,
uses 7440-50-8, Copper, uses 11106-92-6
RL: TEM (Technical or engineered material use); USES (Uses)
(**porous, substrate**; method of fabrication of gas
diffusion **electrode** with nanosized **pores** for
polymer electrolyte membrane **fuel**
cells)
IT 7440-44-0, Carbon, uses
RL: TEM (Technical or engineered material use); USES (Uses)
(**substrate**; method of fabrication of gas diffusion
electrode with nanosized **pores** for **polymer**
electrolyte membrane **fuel cells**)
IT **163294-14-2, nafion** 112
RL: DEV (Device component use); USES (Uses)
(method of fabrication of gas diffusion **electrode** with
nanosized **pores** for **polymer electrolyte**
membrane **fuel cells**)
RN 163294-14-2 HCAPLUS

CN Nafion 112 (CA INDEX NAME)

*** STRUCTURE DIAGRAM IS NOT AVAILABLE ***

IT **12597-68-1, stainless steel**, uses
RL: TEM (Technical or engineered material use); USES (Uses)
(method of fabrication of gas diffusion **electrode** with nanosized **pores** for **polymer electrolyte** membrane **fuel cells**)
RN 12597-68-1 HCAPLUS
CN Stainless steel (CA INDEX NAME)

*** STRUCTURE DIAGRAM IS NOT AVAILABLE ***

L93 ANSWER 13 OF 23 HCAPLUS COPYRIGHT 2007 ACS on STN
AN **2001:632217** HCAPLUS
DN 135:183311
TI Separators for solid **polymer electrolyte fuel cells**
IN Okuda, Nobuyuki; Okubo, Soichiro; Ohara, Hisanori
PA Sumitomo Electric Industries, Ltd., Japan
SO Jpn. Kokai Tokkyo Koho, 9 pp.
CODEN: JKXXAF
DT **Patent**
LA Japanese
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 2001236967	A	20010831	JP 2000-49334	20000225 <--
PRAI	JP 2000-49334		20000225 <--		

AB The separators have a metal **substrate coated** with ≥2 different metal nitride layers.
IC ICM **H01M0008-02**
ICS **H01M0008-10**
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
ST **polymer electrolyte fuel cell**
metal separator nitride **coating**
IT **Fuel cell** separators
(metal separators with multiple different metal nitride **coatings** for **polymer electrolyte fuel cells**)
IT **11109-50-5**, sus 304 12616-83-0, a 5052
RL: DEV (Device component use); USES (Uses)
(metal separators with multiple different metal nitride **coatings** for **polymer electrolyte fuel cells**)
IT 12033-19-1, Molybdenum nitride (MoN) 12033-62-4, Tantalum nitride
12058-38-7, Tungsten nitride (WN) 24094-93-7, Chromium nitride (CrN)
24304-00-5, Aluminum nitride 24621-21-4, Niobium nitride
24646-85-3, Vanadium nitride 25583-20-4, Titanium nitride 25658-42-8,
Zirconium nitride 25817-87-2, Hafnium nitride
RL: MOA (Modifier or additive use); USES (Uses)
(metal separators with multiple different metal nitride **coatings** for **polymer electrolyte fuel cells**)
IT **11109-50-5**, sus 304
RL: DEV (Device component use); USES (Uses)
(metal separators with multiple different metal nitride **coatings** for **polymer electrolyte fuel cells**)
RN 11109-50-5 HCAPLUS

CN Iron alloy, base, Fe 66-74,Cr 18.00-20.00,Ni 8.00-10.50,Mn 0-2.00,Si 0-1.00,C 0-0.08,P 0-0.045,S 0-0.030 (UNS S30400) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Fe	66 - 74	7439-89-6
Cr	18.00 - 20.00	7440-47-3
Ni	8.00 - 10.50	7440-02-0
Mn	0 - 2.00	7439-96-5
Si	0 - 1.00	7440-21-3
C	0 - 0.08	7440-44-0
P	0 - 0.045	7723-14-0
S	0 - 0.030	7704-34-9

IT **24304-00-5**, Aluminum nitride
RL: MOA (Modifier or additive use); USES (Uses)
(metal separators with multiple different metal nitride **coatings** for **polymer electrolyte fuel cells**)
RN 24304-00-5 HCAPLUS
CN Aluminum nitride (AlN) (CA INDEX NAME)

N
|||
Al

L93 ANSWER 14 OF 23 HCAPLUS COPYRIGHT 2007 ACS on STN
AN **2001:101462** HCAPLUS
DN 134:134143
TI Structures and fabrication techniques for solid state **electrochemical** devices
IN Visco, Steven J.; Jacobson, Craig P.; Dejonghe, Lutgard C.
PA The Regents of the University of California, USA
SO PCT Int. Appl., 45 pp.
CODEN: PIXXD2
DT **Patent**
LA English
FAN.CNT 2

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE	
PI	WO 2001009968	A1	20010208	WO 2000-US20889	20000728	<--

W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, BY

RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE	
US 6605316	B1	20030812	US 2000-626629	20000727	<--
EP 1228546	A1	20020807	EP 2000-953766	20000728	<--
EP 1228546	B1	20060405			

R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE	
AT 322745	T	20060415	AT 2000-953766	20000728	<--

	ES 2261225	T3	20061116	ES 2000-953766	20000728 <--
	US 2003059668	A1	20030327	US 2002-273812	20021017 <--
	US 6979511	B2	20051227		
	US 2006057295	A1	20060316	US 2005-260009	20051026 <--
	US 7118777	B2	20061010		
	US 2006234112	A1	20061019	US 2006-471774	20060620 <--
PRAI	US 1999-146769P	P	19990731 <--		
	US 2000-626629	A	20000727 <--		
	WO 2000-US20889	W	20000728 <--		
	US 2002-273812	A1	20021017 <--		
	US 2005-260009	A1	20051026		

AB Provided are low-cost, mech. strong, highly **electronically conductive porous substrates** and associated structures for solid-state **electrochem.** devices, techniques for forming these structures, and devices incorporating the structures. The invention provides solid state **electrochem.** device **substrates** of novel composition and techniques for forming thin **electrode**/membrane/**electrolyte coatings** on the novel or more conventional **substrates**. In particular, in one embodiment the invention provides techniques for co-firing of device **substrate** (often an **electrode**) with an **electrolyte** or membrane layer to form densified **electrolyte**/membrane films 5 to 20 μm thick. In another embodiment, densified **electrolyte**/membrane films 5 to 20 μm thick may be formed on a pre-sintered **substrate** by a constrained sintering process. In some cases, the **substrate** may be a **porous** metal, alloy, or non-nickel cermet incorporating one or more of the transition metals Cr, Fe, Cu and Ag, or alloys thereof.

IC **H01M0008-00**

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 55, 57, 72

ST **electrochem** device solid state; **fuel cell** solid state

IT **Coating** process
(dip; structures and fabrication techniques for solid state **electrochem.** devices)

IT Catalysts
(**electrocatalysts**; structures and fabrication techniques for solid state **electrochem.** devices)

IT **Electric apparatus**
(**electrochem.**; structures and fabrication techniques for solid state **electrochem.** devices)

IT **Electric conductors**
(mixed, **electronic**-ionic; structures and fabrication techniques for solid state **electrochem.** devices)

IT Transition metal alloys
Transition metals, uses
RL: TEM (Technical or engineered material use); USES (Uses)
(non-noble, **substrate**; structures and fabrication techniques for solid state **electrochem.** devices)

IT **Coating** process
(spray, aerosol; structures and fabrication techniques for solid state **electrochem.** devices)

IT Ceramic **coatings**
Electrophoretic deposition
Ionic **conductors**
Sintering
Solid state **fuel cells**
Thermal expansion
(structures and fabrication techniques for solid state

electrochem. devices)
IT Cermets
(**substrate**; structures and fabrication techniques for solid state **electrochem.** devices)
IT Molding
(tape-casting; structures and fabrication techniques for solid state **electrochem.** devices)
IT Diffusion
(vacuum; structures and fabrication techniques for solid state **electrochem.** devices)
IT **25805-17-8**, XUS 40303.00
RL: TEM (Technical or engineered material use); USES (Uses)
(binder; structures and fabrication techniques for solid state **electrochem.** devices)
IT 12036-39-4, Strontium zirconium oxide srzro3 12267-77-5, Barium cerium oxide baceo3 12267-97-9, Cerium strontium oxide cesro3
RL: TEM (Technical or engineered material use); USES (Uses)
(doped; structures and fabrication techniques for solid state **electrochem.** devices)
IT 12597-69-2, **Steel**, uses
RL: TEM (Technical or engineered material use); USES (Uses)
(ferritic, **substrate**; structures and fabrication techniques for solid state **electrochem.** devices)
IT 112721-99-0
RL: DEV (Device component use); USES (Uses)
(structures and fabrication techniques for solid state **electrochem.** devices)
IT 1333-74-0P, Hydrogen, preparation
RL: SPN (Synthetic preparation); PREP (Preparation)
(structures and fabrication techniques for solid state **electrochem.** devices)
IT 222613-26-5, Cobalt iron strontium oxide Co0.75Fe0.25SrO3
RL: TEM (Technical or engineered material use); USES (Uses)
(structures and fabrication techniques for solid state **electrochem.** devices)
IT 11109-52-7, AISI 430 **12611-79-9**, AISI 410 39418-83-2, AISI 409
RL: TEM (Technical or engineered material use); USES (Uses)
(**substrate**, composite with ceramic; structures and fabrication techniques for solid state **electrochem.** devices)
IT 1344-28-1, Alumina, uses 7439-89-6, Iron, uses 7440-02-0, Nickel, uses 7440-22-4, Silver, uses 7440-47-3, Chromium, uses 7440-50-8, Copper, uses 11078-74-3, Bismuth yttrium oxide (Bi3YO6) 12606-02-9, Inconel 600 59989-70-7D, Cobalt samarium strontium oxide CoSm0.5Sr0.5O3, oxygen-deficient 64417-98-7, Yttrium zirconium oxide 106830-29-9, Yttrium zirconium oxide Y0.2Zr0.9O2.1 108916-22-9D, Lanthanum manganese strontium oxide La0.8MnSr0.2O3, oxygen-deficient 111569-09-6, Scandium zirconium oxide 114168-16-0, Tz-8y 116036-94-3D, Iron lanthanum nickel oxide Fe0.4LaNi0.6O3, oxygen-deficient 141588-91-2D, Lanthanum manganese strontium oxide La0.45MnSr0.55O3, oxygen-deficient 157975-55-8D, Lanthanum manganese strontium oxide La0.65MnSr0.3O3, oxygen-deficient 181530-05-2D, Cobalt iron lanthanum strontium oxide Co0.6Fe0.4La0.6Sr0.4O3, oxygen-deficient 197160-34-2, Cerium gadolinium oxide Ce0.8Gd0.4O2.2 235428-75-8D, Cerium manganese strontium oxide Ce0.3MnSr0.7O3, oxygen-deficient 252913-17-0, Gallium lanthanum magnesium strontium oxide Ga0.85La0.8Mg0.15Sr0.2O2.8 321909-12-0D, Lanthanum manganese strontium oxide (La0-0.95Mn0.95-1.15Sr0.05-1O3), oxygen-deficient 321909-14-2D, Cobalt lanthanum strontium oxide (CoLa0-0.9Sr0.1-1O3), oxygen-deficient 321909-15-3D, Cobalt iron strontium oxide (Co0.7-0.8Fe0.2-0.3SrO3), oxygen-deficient 321981-55-9, Cr5Fe1Y

RL: TEM (Technical or engineered material use); USES (Uses)
(**substrate**; structures and fabrication techniques for solid state **electrochem**. devices)

IT 1314-23-4, Zirconia, uses
RL: TEM (Technical or engineered material use); USES (Uses)
(yttria-stabilized, **substrate**; structures and fabrication techniques for solid state **electrochem**. devices)

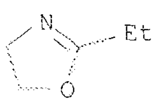
IT 1314-36-9, Yttria, uses 12060-08-1, Scandia
RL: TEM (Technical or engineered material use); USES (Uses)
(zirconia stabilized with, **substrate**; structures and fabrication techniques for solid state **electrochem**. devices)

IT **25805-17-8**, XUS 40303.00
RL: TEM (Technical or engineered material use); USES (Uses)
(binder; structures and fabrication techniques for solid state **electrochem**. devices)

RN 25805-17-8 HCAPLUS
CN Oxazole, 2-ethyl-4,5-dihydro-, homopolymer (CA INDEX NAME)

CM 1

CRN 10431-98-8
CMF C5 H9 N O



IT **12611-79-9**, AISI 410
RL: TEM (Technical or engineered material use); USES (Uses)
(**substrate**, composite with ceramic; structures and fabrication techniques for solid state **electrochem**. devices)

RN 12611-79-9 HCAPLUS
CN Iron alloy, base, Fe 84-88,Cr 11.50-13.50,Mn 0-1.00,Si 0-1.00,C 0-0.15,P 0-0.040,S 0-0.030 (UNS S41000) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Fe	84 - 88	7439-89-6
Cr	11.50 - 13.50	7440-47-3
Mn	0 - 1.00	7439-96-5
Si	0 - 1.00	7440-21-3
C	0 - 0.15	7440-44-0
P	0 - 0.040	7723-14-0
S	0 - 0.030	7704-34-9

RETABLE

Referenced Author (RAU)	Year (RPY)	VOL (RVL)	PG (RPG)	Referenced Work (RWK)	Referenced File
Cable	1996			US 5589285 A	HCAPLUS
Kawasaki	1996			US 5480739 A	HCAPLUS
Wallin	1997			US 5670270 A	HCAPLUS

L93 ANSWER 15 OF 23 HCAPLUS COPYRIGHT 2007 ACS on STN
AN **2000:271877** HCAPLUS
DN 132:281631
TI **Fuel cell** system for low pressure operation

IN Cisar, Alan J.; Weng, Dacong; Murphy, Oliver J.
PA Lynntech, Inc., USA
SO U.S., 31 pp., Cont.-in-part of U.S. 5,709,961.
CODEN: USXXAM
DT **Patent**
LA English
FAN.CNT 3

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	US 6054228	A	20000425	US 1997-926547	19970910 <--
	US 5709961	A	19980120	US 1996-656968	19960606 <--
	WO 9934467	A2	19990708	WO 1998-US19221	19980910 <--
	WO 9934467	A3	19991111		
	W: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, GM, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW				
	RW: GH, GM, KE, LS, MW, SD, SZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG				
	AU 9894858	A	19990719	AU 1998-94858	19980910 <--
	EP 1025605	A2	20000809	EP 1998-948243	19980910 <--
	EP 1025605	B1	20030716		
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, NL, SE				
	AT 245311	T	20030815	AT 1998-948243	19980910 <--
	EP 1339120	A2	20030827	EP 2003-11855	19980910 <--
	EP 1339120	A3	20070725		
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, NL, SE				
	ES 2198754	T3	20040201	ES 1998-948243	19980910 <--
	US 6410180	B1	20020625	US 2000-523910	20000313 <--
	US 2002195335	A1	20021226	US 2002-119380	20020409 <--
	US 6733913	B2	20040511		
	US 2002192523	A1	20021219	US 2002-151692	20020518 <--
	US 6852437	B2	20050208		
	US 2005130007	A1	20050616	US 2004-983450	20041108 <--
	US 7078361	B2	20060718		
PRAI	US 1996-656968	A2	19960606 <--		
	US 1997-926547	A	19970910 <--		
	EP 1998-948243	A3	19980910 <--		
	WO 1998-US19221	W	19980910 <--		
	US 2000-523910	A3	20000313 <--		
	US 2002-119380	A1	20020409 <--		
	US 2002-151692	A1	20020518 <--		

AB An improved **fuel cell** design for use at low pressure has a reduced number of component parts to reduce fabrication costs, as well as a simpler design that permits the size of the system to be reduced at the same time as performance is being improved. In the present design, an adjacent anode and cathode pair are fabricated using a common **conductive** element, with that **conductive** element serving to **conduct** the current from one cell to the adjacent one. This produces a small and simple system suitable for operating with gas fuels or alternatively directly with liquid fuels, such as methanol, dimethoxymethane, or trimethoxymethane. The use of these liquid fuels permits the storage of more energy in less volume while at the same time eliminating the need for handling compressed gases which further simplifies the **fuel cell** system. The **elec.** power output of the design of this invention can be further increased by adding a passage for cooling the stack through contact with a coolant.

IC ICM **H01M0008-24**

INCL 429018000
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38
ST **fuel cell** system low pressure operation
IT **Perfluoro** compounds
RL: DEV (Device component use); USES (Uses)
(carboxylic acids, **polymers**; **fuel cell**
system for low pressure operation)
IT Catalysts
(**electrocatalysts**; **fuel cell** system for
low pressure operation)
IT **Polyoxyalkylenes, uses**
RL: DEV (Device component use); TEM (Technical or engineered material
use); USES (Uses)
(**fluorine**- and **sulfo**-containing, **ionomers**;
fuel cell system for low pressure operation)
IT **Polyoxyalkylenes, uses**
RL: DEV (Device component use); TEM (Technical or engineered material
use); USES (Uses)
(**fluorine**-containing, **sulfo**-containing, **ionomers**;
fuel cell system for low pressure operation)
IT Cation exchange membranes
Conducting polymers
Fuel cells
Solders
(**fuel cell** system for low pressure operation)
IT Carbon black, uses
Carbon fibers, uses
Epoxy resins, uses
Fluoropolymers, uses
Polymers, uses
Polysiloxanes, uses
Urethanes
RL: DEV (Device component use); USES (Uses)
(**fuel cell** system for low pressure operation)
IT Alcohols, uses
RL: RCT (Reactant); TEM (Technical or engineered material use); RACT
(Reactant or reagent); USES (Uses)
(**fuel cell** system for low pressure operation)
IT Carbon fibers, uses
RL: DEV (Device component use); USES (Uses)
(graphite, cloth; **fuel cell** system for low pressure
operation)
IT Metals, uses
RL: DEV (Device component use); USES (Uses)
(mesh; **fuel cell** system for low pressure operation)
IT Wires
(metal, weave; **fuel cell** system for low pressure
operation)
IT Foams
(metal; **fuel cell** system for low pressure
operation)
IT Carboxylic acids, uses
RL: DEV (Device component use); USES (Uses)
(**perfluoro**, **polymers**; **fuel cell**
system for low pressure operation)
IT **Sulfonic** acids, uses
Sulfonic acids, uses
RL: DEV (Device component use); USES (Uses)
(**perfluoro**; **fuel cell** system for low

pressure operation)

IT **Fluoropolymers, uses**
Fluoropolymers, uses
RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)
(**polyoxyalkylene-, sulfo**-containing, **ionomers** ; **fuel cell** system for low pressure operation)

IT **Ionomers**
RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)
(**polyoxyalkylenes, fluorine-** and **sulfo** -containing; **fuel cell** system for low pressure operation)

IT **Perfluoro** compounds
Perfluoro compounds
RL: DEV (Device component use); USES (Uses)
(**sulfonic** acids; **fuel cell** system for low pressure operation)

IT Imides
Imides
Sulfonic acids, uses
Sulfonic acids, uses
RL: DEV (Device component use); USES (Uses)
(**sulfonimides, perfluoro, polymers; fuel cell** system for low pressure operation)

IT Plastics, uses
RL: DEV (Device component use); USES (Uses)
(thermoplastics; **fuel cell** system for low pressure operation)

IT 7782-42-5, Graphite, uses
RL: DEV (Device component use); USES (Uses)
(foam; **fuel cell** system for low pressure operation)

IT 7429-90-5, Aluminum, uses 7440-02-0, Nickel, uses 7440-03-1, Niobium, uses 7440-32-6, Titanium, uses 7440-44-0, Carbon, uses 7440-50-8, Copper, uses 9002-84-0, Ptfe **12597-68-1, Stainless steel**, uses 13598-36-2D, Phosphonic acid, **perfluoro** derivs., **polymers**
RL: DEV (Device component use); USES (Uses)
(**fuel cell** system for low pressure operation)

IT **162774-80-3, Nafion** 105 **163294-14-2, Nafion** 112
RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)
(**fuel cell** system for low pressure operation)

IT 60-29-7, Ether, uses 67-56-1, Methanol, uses 109-87-5, Dimethoxymethane 149-73-5, Trimethoxymethane 1333-74-0, Hydrogen, uses
RL: RCT (Reactant); TEM (Technical or engineered material use); RACT (Reactant or reagent); USES (Uses)
(**fuel cell** system for low pressure operation)

IT 7440-05-3, Palladium, uses 7440-06-4, **Platinum**, uses 7440-18-8, Ruthenium, uses 7440-57-5, Gold, uses
RL: TEM (Technical or engineered material use); USES (Uses)
(**plating; fuel cell** system for low pressure operation)

IT 9002-93-1, Triton x 100
RL: TEM (Technical or engineered material use); USES (Uses)
(**surfactant; fuel cell** system for low pressure operation)

IT **12597-68-1, Stainless steel**, uses
RL: DEV (Device component use); USES (Uses)

(**fuel cell** system for low pressure operation)
RN 12597-68-1 HCAPLUS
CN Stainless steel (CA INDEX NAME)

*** STRUCTURE DIAGRAM IS NOT AVAILABLE ***
IT **162774-80-3, Nafion** 105 **163294-14-2, Nafion** 112
RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)
(**fuel cell** system for low pressure operation)
RN 162774-80-3 HCAPLUS
CN Nafion 105 (CA INDEX NAME)

*** STRUCTURE DIAGRAM IS NOT AVAILABLE ***
RN 163294-14-2 HCAPLUS
CN Nafion 112 (CA INDEX NAME)

*** STRUCTURE DIAGRAM IS NOT AVAILABLE ***
RETABLE

Referenced Author (RAU)	Year (RPY)	VOL (RVL)	PG (RPG)	Referenced Work (RWK)	Referenced File
Anon	1996			DE 4443945 C1	HCAPLUS
Binder	1974			US 3854994	
Cisar	1998			US 5706961	
Dhar	1993			US 5242764	HCAPLUS
Iwata, T	1994			JP 06243879	HCAPLUS
Johnson	1998			US 5840438	HCAPLUS
Ledjeff	1999			US 5861221	HCAPLUS
Ledjeff	1999			US 5863672	HCAPLUS
Leonard, T	1994			WO 9425991	HCAPLUS
Niedrach	1964			US 3134697	HCAPLUS
Niedrach	1967			US 3297484	HCAPLUS
Niedrach	1969			US 3432355	
Nishida	1997			US 5686197	HCAPLUS
Raistrick	1989			US 4876115	HCAPLUS
Rao	1991			US 5053375	HCAPLUS
Rogers	1982			US 4364805	HCAPLUS
Rohr	1992			US 5171646	
Rowe	1980			US 4235693	HCAPLUS
Spear	1999			US 5863671	HCAPLUS
Surampudi	1997			US 5599638	HCAPLUS
Sweeney	1986			US 4596648	HCAPLUS
Tocker	1967			US 3297485	
Watanabe	1993			US 5246792	HCAPLUS
Yamada	1994			US 5364711	HCAPLUS

L93 ANSWER 16 OF 23 HCAPLUS COPYRIGHT 2007 ACS on STN
AN **2000:85138** HCAPLUS
DN 132:110644
TI **Fuel cell** with **polymer electrolyte** membrane
IN Zedda, Mario; Heinzel, Angelika; Nolte, Roland
PA Fraunhofer-Gesellschaft Zur Forderung Der Angewandten Forschung E.V., Germany
SO PCT Int. Appl., 28 pp.
CODEN: PIXXD2
DT **Patent**
LA German
FAN.CNT 1

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     PATENT NO.          KIND  DATE       APPLICATION NO.       DATE
     ---------------     ----  --------   ------------------    --------
PI   WO 2000005776        A1   20000203   WO 1999-EP5146        19990720 <--
         W: US
         RW: AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL,
             PT, SE
     DE 19833064          A1   20000203   DE 1998-19833064      19980722 <--
     DE 19833064          C2   20011011
     EP 1105932           A1   20010613   EP 1999-941445        19990720 <--
     EP 1105932           B1   20060614
         R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT,
             IE, FI, CY
     AT 330333            T    20060715   AT 1999-941445        19990720 <--
PRAI DE 1998-19833064     A    19980722  <--
     WO 1999-EP5146       W    19990720  <--
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AB The invention relates to a **fuel cell** for high output voltages, consisting of a flat system of at least two individual **fuel cells** positioned in a housing which each have an **electrolyte** membrane **coated** with **electrodes** to serve as an anode and cathode. The consecutive, adjacent individual cells are **elec.** connected in series in that the anode of an individual cell is connected with the cathode of the adjacent individual cell via an **elec. conductive** transverse structure. In its **surface** plane the transverse **conducting** structure in the intermediate area is impermeable to the fuel and the **electrolyte** membranes of the adjacent individual cells extend into the intermediate area between the individual cells, overlap each other and cover the transverse **conducting** structure in a sealing manner from one side each.

IC ICM **H01M0008-24**
ICS **H01M0008-10**

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38

ST **fuel cell polymer electrolyte** membrane

IT Cation exchange membranes
Fuel cell electrolytes
Fuel cells
Polymer electrolytes
(**fuel cell** with **polymer electrolyte** membrane)

IT **Fluoropolymers**, uses
Polybenzimidazoles
Polysulfones, uses
RL: TEM (Technical or engineered material use); USES (Uses)
(**fuel cell** with **polymer electrolyte** membrane)

IT **Polyketones**
Polyketones
Polysulfones, uses
Polysulfones, uses
RL: TEM (Technical or engineered material use); USES (Uses)
(**polyether-; fuel cell** with **polymer electrolyte** membrane)

IT **Polyethers, uses**
Polyethers, uses
RL: TEM (Technical or engineered material use); USES (Uses)
(**polyketone-; fuel cell** with **polymer electrolyte** membrane)

IT **Polyethers, uses**

Polyethers, uses
RL: TEM (Technical or engineered material use); USES (Uses)
(**polysulfone-; fuel cell** with
polymer electrolyte membrane)

IT Fuel gas manufacturing
(reforming; **fuel cell** with **polymer**
electrolyte membrane)

IT 7440-32-6, Titanium, uses 7440-44-0, Carbon, uses **12597-68-1, Stainless steel**, uses
RL: DEV (Device component use); USES (Uses)
(**fuel cell** with **polymer**
electrolyte membrane)

IT 67-56-1, Methanol, uses
RL: RCT (Reactant); TEM (Technical or engineered material use); RACT (Reactant or reagent); USES (Uses)
(**fuel cell** with **polymer**
electrolyte membrane)

IT 1333-74-0P, Hydrogen, uses
RL: SPN (Synthetic preparation); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)
(**fuel cell** with **polymer**
electrolyte membrane)

IT 9002-84-0, Ptfe **9002-88-4, Polyethylene** 9003-07-0, **Polypropylene** 9003-53-6, **Polystyrene**
RL: TEM (Technical or engineered material use); USES (Uses)
(**fuel cell** with **polymer**
electrolyte membrane)

IT **12597-68-1, Stainless steel**, uses
RL: DEV (Device component use); USES (Uses)
(**fuel cell** with **polymer**
electrolyte membrane)

RN 12597-68-1 HCAPLUS
CN Stainless steel (CA INDEX NAME)

*** STRUCTURE DIAGRAM IS NOT AVAILABLE ***

IT **9002-88-4, Polyethylene**
RL: TEM (Technical or engineered material use); USES (Uses)
(**fuel cell** with **polymer**
electrolyte membrane)

RN 9002-88-4 HCAPLUS
CN Ethene, homopolymer (CA INDEX NAME)

CM 1

CRN 74-85-1
CMF C2 H4

$H_2C=CH_2$

RETABLE

Referenced Author (RAU)	Year (RPY)	VOL (RVL)	PG (RPG)	Referenced Work (RWK)	Referenced File
Fraunhofer Ges Forschun	1996			DE 19502391 C	HCAPLUS
Fraunhofer Ges Forschun	1996			WO 9618216 A	HCAPLUS
Fraunhofer Ges Forschun	1996			WO 9618217 A	HCAPLUS
Gore & Ass	1998			WO 9816963 A	HCAPLUS
Mitsubishi Electric Cor	1986			JP 61121265 A	HCAPLUS

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Mitsubishi Heavy Ind Lt|1993 |      |      |JP 05041221 A      |
Sanyo Electric Co Ltd  |1993 |      |      |JP 05325993 A      |
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L93 ANSWER 17 OF 23 HCAPLUS COPYRIGHT 2007 ACS on STN
AN **1998:627972** HCAPLUS
DN 130:18276
TI Development of solid **polymer electrolyte** water **electrolyzer** with 200 cm2 5-cell
AU Nakanori, Takahiro; Okisawa, Kayoko; Yamaguchi, Mikimasa
CS New Energy Laboratory, Fuji Electric Corporate Research and Development, Ltd., Yokosuka City, 240-01, Japan
SO Proceedings of the Intersociety Energy Conversion Engineering Conference (**1998**), 33rd, IECEC113/1-IECEC113/6
CODEN: PIECDE; ISSN: 0146-955X
PB Society of Automotive Engineers
DT Journal; (computer optical disk)
LA English
AB Fuji **Elec.** Corporate Research and Development, Ltd. was developing technologies for high performance solid **polymer electrolyte** water **electrolyzers** in national project WE-NET. In term of tech. features, Fuji **Elec.**'s technol. approach calls for membrane-**electrode** assemblies to be formed by a hot-press method. The authors have manufactured a 200. cm2 membrane-**electrode** assemblies by the hot-press method, and have developed a 5-cell stack with the 200 cm2 membrane-**electrode** assembly, that registered 7.850 V of stack voltage and 93.2% of energy efficiency at 1 A/cm2 and at 80° under atmospheric pressure. And at 5 A/cm2 of high c.d., the stack registered 9.308 V of stack voltage and 79.7% of energy efficiency at 90°.
CC 72-9 (Electrochemistry)
Section cross-reference(s): 49, 52
ST solid **polymer electrolyte** water **electrolyzer** ; membrane cell solid **polymer electrolyte** water; **perfluorosulfonic** acid **polymer** membrane cell water
IT **Electrodeposits**
(cathode support collector from sintered stainless fiber **plate electroplated** with gold and anode support collector from sintered titanium fiber **plate electroplated** with **platinum** for solid **polymer electrolyte** water **electrolyzer**)
IT Power
(consumption for solid **polymer electrolyte** water **electrolyzer** with 200 cm2 5-cell)
IT **Electrolytic cells**
(membrane; solid **polymer electrolyte** water **electrolyzer** with 200 cm2 5-cell)
IT **Sulfonic** acids, uses
RL: DEV (Device component use); PRP (Properties); USES (Uses)
(**perfluorosulfonic** acid **polymers**; development of solid **polymer electrolyte** water **electrolyzer** with 200 cm2 5-cell)
IT Metallic fibers
RL: DEV (Device component use); PRP (Properties); USES (Uses)
(**stainless steel**; cathode support collector from sintered **stainless** fiber **plate electroplated** with gold for solid **polymer electrolyte** water **electrolyzer** with 200 cm2 5-cell)
IT **Fluoropolymers, uses**
Fluoropolymers, uses
RL: DEV (Device component use); PRP (Properties); USES (Uses)

(**sulfo**-containing; development of solid **polymer electrolyte** water **electrolyzer** with 200 cm2 5-cell)
IT Metallic fibers
RL: DEV (Device component use); PRP (Properties); USES (Uses)
(titanium; anode support collector from sintered titanium fiber **plate electroplated** with **platinum** for solid **polymer electrolyte** water **electrolyzer** with 200 cm2 5-cell)
IT Ion exchange membranes
(water **electrolyzer** with 200 cm2 5-cell with)
IT 7440-32-6, Titanium, uses
RL: DEV (Device component use); PRP (Properties); USES (Uses)
(anode support collector from sintered titanium fiber **plate electroplated** with **platinum** for solid **polymer electrolyte** water **electrolyzer** with 200 cm2 5-cell)
IT 7440-06-4, **Platinum**, uses
RL: CAT (Catalyst use); DEV (Device component use); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
(catalyst in solid **polymer electrolyte** water **electrolyzer** with 200 cm2 5-cell)
IT 12030-49-8P, Iridium dioxide
RL: CAT (Catalyst use); PNU (Preparation, unclassified); PREP (Preparation); USES (Uses)
(catalyst in solid **polymer electrolyte** water **electrolyzer** with 200 cm2 5-cell)
IT 7440-57-5, Gold, uses **12597-68-1, Stainless steel**, uses
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
(cathode support collector from sintered **stainless** fiber **plate electroplated** with gold for solid **polymer electrolyte** water **electrolyzer** with 200 cm2 5-cell)
IT 7732-18-5, Water, processes
RL: PEP (Physical, engineering or chemical process); PROC (Process)
(**electrolysis**; solid **polymer electrolyte** water **electrolyzer** with 200 cm2 5-cell)
IT 7732-18-5, Water, properties
RL: PEP (Physical, engineering or chemical process); PRP (Properties); PROC (Process)
(solid **polymer electrolyte electrolyzer** with 200 cm2 5-cell for **electrolysis** of)
IT 1333-74-0P, Hydrogen, properties 7782-44-7P, Oxygen, properties
RL: PNU (Preparation, unclassified); PRP (Properties); PREP (Preparation)
(solid **polymer electrolyte** water **electrolyzer** with 200 cm2 5-cell for preparation of)
IT **12597-68-1, Stainless steel**, uses
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
(cathode support collector from sintered **stainless** fiber **plate electroplated** with gold for solid **polymer electrolyte** water **electrolyzer** with 200 cm2 5-cell)
RN 12597-68-1 HCAPLUS
CN Stainless steel (CA INDEX NAME)

*** STRUCTURE DIAGRAM IS NOT AVAILABLE ***
RETABLE

Referenced Author (RAU)	Year (RPY)	VOL (RVL)	PG (RPG)	Referenced Work (RWK)	Referenced File

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=====================+=====+=====+======+===================+==========
Nakanori, T          |1997 |     |126   |Proceeding of the 4t|
Nakanori, T          |     |     |91    |Proceeding of the 64|
Yamaguchi, M         |1995 |95   |205   |International Hydrog|
Yamaguchi, M         |1997 |     |1958  |Proceeding of the 32|HCAPLUS
```

L93 ANSWER 18 OF 23 HCAPLUS COPYRIGHT 2007 ACS on STN
AN **1996:588645** HCAPLUS
DN 125:226512
TI Method for sealing solid **polymer electrolyte fuel cells**
IN Seki, Tsutomu
PA Tokyo Gas Co Ltd, Japan
SO Jpn. Kokai Tokkyo Koho, 5 pp.
CODEN: JKXXAF
DT **Patent**
LA Japanese
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 08185875	A	19960716	JP 1994-339776	19941228 <--
PRAI	JP 1994-339776		19941228 <--		

AB In the sealing of the **fuel cells** using **polymer electrolyte** membranes joined to separators by a binder, the **electrolyte** membrane and the separator are pressed, without drying the binder, in a ≥100° bath to join the **electrolyte** membrane in a hydrated form to the separator. The **electrolyte** is preferably a **perfluorocarbon sulfonic** acid membrane, the separator is C or noble metal **plated stainless steel**, and the binder is a thermoplastic **polymer**.
IC ICM **H01M0008-02**
ICS **H01M0008-10**
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
ST **fuel cell polymer electrolyte** membrane sealing; separator **polymer electrolyte** sealing **fuel cell**
IT **Fuel-cell electrolytes**
(sealing of **polymer electrolyte** membranes and **platinum coated stainless steel** separators with thermoplastic binders for for **fuel cells**)
IT Rubber, silicone, uses
RL: NUU (Other use, unclassified); USES (Uses)
(thermoplastic binders for sealing **polymer electrolyte** membranes and **platinum coated stainless steel** separators for **fuel cells**)
IT **Fuel cells**
(separators, sealing of **polymer electrolyte** membranes and **platinum coated stainless steel** separators with thermoplastic binders for for **fuel cells**)
IT **66796-30-3, Nafion** 117
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
(method for sealing **Nafion** 117 solid **polymer electrolyte** membranes and separators for **fuel cells**)
IT **12597-68-1, Stainless steel**, uses

RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
(method for sealing **polymer electrolyte** membranes and **platinum coated stainless steel** separators for **fuel cells**)

IT 7440-06-4, **Platinum**, uses
RL: MOA (Modifier or additive use); USES (Uses)
(method for sealing **polymer electrolyte** membranes and **platinum coated stainless steel** separators for **fuel cells**)

IT **66796-30-3, Nafion** 117
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
(method for sealing **Nafion** 117 solid **polymer electrolyte** membranes and separators for **fuel cells**)

RN 66796-30-3 HCAPLUS

CN Nafion 117 (CA INDEX NAME)

*** STRUCTURE DIAGRAM IS NOT AVAILABLE ***

IT **12597-68-1, Stainless steel,** uses
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
(method for sealing **polymer electrolyte** membranes and **platinum coated stainless steel** separators for **fuel cells**)

RN 12597-68-1 HCAPLUS

CN Stainless steel (CA INDEX NAME)

*** STRUCTURE DIAGRAM IS NOT AVAILABLE ***

L93 ANSWER 19 OF 23 HCAPLUS COPYRIGHT 2007 ACS on STN

AN **1996:455524** HCAPLUS

DN 125:152968

TI Tritium enrichment by **electrolysis** using solid **polymer electrolyte**

AU Uematsu, Kazuyoshi; Yamazaki, Hisashi; Sato, Mineo

CS Fac. Eng., Niigata Univ., Niigata, 950-21, Japan

SO Radioisotopes (**1996**), 45(6), 375-377
CODEN: RAISAB; ISSN: 0033-8303

PB Nippon Aisotopu Kyokai

DT Journal

LA Japanese

AB An ion exchange membrane (du Pont **Nafion** 117) was sandwiched with metal **electrodes** of 100 mesh nets of Ni, Cu or SUS 304 **stainless steel** or 80 mesh nets of Pt. Both sides of the **electrode** assembly was reinforced with 20 mesh Ti nets. The assembly was set in an **electrolytic cell** and 12 cm3 of water containing 110-140 BqT/cm3 was **electrolyzed** to 2 cm3. Radioactivity of T was counted with a liquid scintillation counter. On **electrolysis** with Ni **electrodes** at 3 V, the separation factor β of T, the ratio of T concentration before and after **electrolysis**, increased from 7.2 at 40° to 22.9 at 1°. **Deposition** of Ni, which was dissolved from the anode, was found near the cathode after the **electrolysis**. The combination of Ni-Ni as an anode and a cathode gave β of 15.2 at 5° but the combinations of Pt-Ni, Pt-Cu, Pt-Pt and Pt-SUS 304 resulted in β of 6-7.

CC 71-6 (Nuclear Technology)
Section cross-reference(s): 72

ST tritium sepn **electrolysis** solid **electrolyte**;
enrichment tritium **electrolysis**
IT **Electrolytes**
Isotope separation
(tritium enrichment by **electrolysis** using **solid**
polymer electrolyte)
IT 7440-02-0, Nickel, uses 7440-06-4, **Platinum**, uses 7440-50-8,
Copper, uses **11109-50-5**, SUS 304
RL: DEV (Device component use); USES (Uses)
(**electrode**; tritium enrichment by **electrolysis**
using solid **polymer electrolyte**)
IT **66796-30-3**, **Nafion** 117
RL: DEV (Device component use); USES (Uses)
(tritium enrichment by **electrolysis** using solid
polymer electrolyte)
IT 10028-17-8P, Tritium, processes
RL: PEP (Physical, engineering or chemical process); SPN (Synthetic
preparation); PREP (Preparation); PROC (Process)
(tritium enrichment by **electrolysis** using solid
polymer electrolyte)
IT **11109-50-5**, SUS 304
RL: DEV (Device component use); USES (Uses)
(**electrode**; tritium enrichment by **electrolysis**
using solid **polymer electrolyte**)
RN 11109-50-5 HCAPLUS
CN Iron alloy, base, Fe 66-74,Cr 18.00-20.00,Ni 8.00-10.50,Mn 0-2.00,Si
0-1.00,C 0-0.08,P 0-0.045,S 0-0.030 (UNS S30400) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Fe	66 - 74	7439-89-6
Cr	18.00 - 20.00	7440-47-3
Ni	8.00 - 10.50	7440-02-0
Mn	0 - 2.00	7439-96-5
Si	0 - 1.00	7440-21-3
C	0 - 0.08	7440-44-0
P	0 - 0.045	7723-14-0
S	0 - 0.030	7704-34-9

IT **66796-30-3**, **Nafion** 117
RL: DEV (Device component use); USES (Uses)
(tritium enrichment by **electrolysis** using solid
polymer electrolyte)
RN 66796-30-3 HCAPLUS
CN Nafion 117 (CA INDEX NAME)

*** STRUCTURE DIAGRAM IS NOT AVAILABLE ***

L93 ANSWER 20 OF 23 HCAPLUS COPYRIGHT 2007 ACS on STN
AN **1991:453420** HCAPLUS
DN 115:53420
TI Stacked **batteries**
IN Yanagisawa, Nobuhiro; Yoneda, Tetsuya; Minamino, Mitsuharu
PA Sharp Corp., Japan
SO Jpn. Kokai Tokkyo Koho, 5 pp.
CODEN: JKXXAF
DT **Patent**
LA Japanese
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 03008256	A	19910116	JP 1989-141575	19890602 <--
PRAI	JP 1989-141575		19890602 <--		

AB The **batteries** have a stack of unit cells of a cathode, an **electrolyte**-containing separator, and an anode, and **elec. conductive** layers among the cells in a sealed **battery** case, whose inside is **coated** with an **elec.** insulator **polymer** layer. Stacked H-absorbing TiNi-MnO2 **batteries** using **polyethylene** spray-**coated stainless steel** cases had higher volume efficiency than **batteries** using **polyethylene** tubes as insulator.

IC ICM **H01M0002-02**
ICS **H01M0006-12; H01M0010-34**

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST hydrogen manganese **battery** case **coating**; **battery stainless steel** case **coating** ; **polyethylene** spray **coating battery** case

IT **Batteries**, secondary
(sealed, hydrogen-manganese dioxide, with **polyethylene** spray-**coated stainless steel** cases, for high efficiency)

IT **9002-88-4, Polyethylene**
RL: USES (Uses)
(**battery** cases from **stainless steel** spray-**coated** with)

IT **12597-68-1, Stainless steel**, uses and miscellaneous
RL: USES (Uses)
(**battery** cases, **polyethylene** spray-**coated**)

IT **9002-88-4, Polyethylene**
RL: USES (Uses)
(**battery** cases from **stainless steel** spray-**coated** with)

RN 9002-88-4 HCAPLUS
CN Ethene, homopolymer (CA INDEX NAME)

CM 1

CRN 74-85-1
CMF C2 H4

$H_2C=CH_2$

IT **12597-68-1, Stainless steel**, uses and miscellaneous
RL: USES (Uses)
(**battery** cases, **polyethylene** spray-**coated**)

RN 12597-68-1 HCAPLUS
CN Stainless steel (CA INDEX NAME)

*** STRUCTURE DIAGRAM IS NOT AVAILABLE ***

L93 ANSWER 21 OF 23 HCAPLUS COPYRIGHT 2007 ACS on STN
AN **1987:206276** HCAPLUS
DN 106:206276

TI **Electrically conductive** circuit **substrates**
IN Tachibana, Kazuhiro
PA Nissha Printing Co., Ltd., Japan
SO Jpn. Kokai Tokkyo Koho, 16 pp.
CODEN: JKXXAF
DT **Patent**
LA Japanese
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 62004388	A	19870110	JP 1985-143382	19850629 <--
PRAI	JP 1985-143382		19850629 <--		

AB A method for forming an **elec. conductive** circuit **substrate** involves: (1) attaching a thin plastic sheet to a vertical or near-vertical cross-section of laminated **elec. conductive** and **polymeric** foils; (2) forming an **electrode** facing the sheet, and filling the space between the sheet and **electrode** with a liquid or pastelike **electrolytic solution** from a hetero-atom-containing aromatic compound, a strong **electrolyte**, and a polar organic solvent containing no active H atoms; (3) applying **elec.** current between the **conductive** foil and **electrode** to **electrolytically** form a circuit pattern on the sheet; and (4) separating the patterned sheet from the cross-section and **electrolytic solution** The method can mass produce the circuit **substrates**
.

IC ICM H05K0003-18
ICS **C25D0007-00; C25D0013-00; C25D0013-08;**
H01B0005-14; H01H0011-04
CC 76-2 (Electric Phenomena)
Section cross-reference(s): 38, 72
ST **conductive elec** circuit **substrate; electrolysis** circuit **substrate** formation
IT **Electric conductors**
(circuit **substrates**, manufacture of, by **electrolysis**)
IT **Electrolysis**
(in **elec. conductive** circuit **substrate** manufacture)
IT **Polysulfones, uses and miscellaneous**
RL: USES (Uses)
(sheets from, **elec. conductive** circuit **substrates** containing)
IT **Electric** circuits
(**substrate** manufacture for)
IT **Polyimides, uses and miscellaneous**
RL: USES (Uses)
(**polyamide-**, sheets from, **elec. conductive** circuit **substrates** containing)
IT **Polyamides, uses and miscellaneous**
RL: USES (Uses)
(**polyimide-**, sheets from, **elec. conductive** circuit **substrates** containing)
IT 9003-47-8, **Polyvinylpyridine** 25233-30-1, **Polyaniline**
27290-25-1 30604-76-3 89298-10-2 89298-12-4 89298-16-8
RL: USES (Uses)
(**elec. conductive** circuit **substrates** containing)
IT 51-17-2, Benzoimidazole 75-05-8, Acetonitrile, uses and miscellaneous
108-32-7 109-97-7, Pyrrol 110-00-9, Furan 110-02-1, Thiophene
110-71-4, Dimethoxyethane 1923-70-2, Tetrabutylammonium perchlorate

3109-63-5, Tetrabutylammonium **hexafluorophosphate** 7631-86-9, Silica, uses and miscellaneous 7782-42-5, Graphite, uses and miscellaneous 7791-03-9, Lithium perchlorate 15780-02-6, Tetrapropylammonium perchlorate 21324-40-3, Lithium **hexafluorophosphate** 22505-56-2 62258-61-1 81901-10-2
RL: USES (Uses)
(in **elec. conductive** circuit **substrate** manufacture)
IT 7440-02-0, Nickel, uses and miscellaneous 7440-06-4, **Platinum**, uses and miscellaneous 7440-50-8, Copper, uses and miscellaneous 9002-84-0, **Polytetrafluoroethylene** 9002-85-1, **Polyvinylidenechloride** 9002-86-2, **Polyvinylchloride** **9002-88-4, Polyethylene** 9003-07-0, **Polypropylene** 9003-53-6 **12597-68-1, Stainless steel**, uses and miscellaneous 24937-79-9, **Polyvinylidenefluoride** 24968-12-5, **Polybutylene** terephthalate 24981-14-4, **Polyvinylfluoride** 25014-41-9, **Polyacrylonitrile** 25038-54-4, Nylon 6, uses and miscellaneous 25038-59-9, **Polyethylene** terephthalate, uses and miscellaneous 32131-17-2, Nylon 66, uses and miscellaneous
RL: USES (Uses)
(sheets from, **elec. conductive** circuit **substrates** containing)
IT **9002-88-4, Polyethylene 12597-68-1, Stainless steel**, uses and miscellaneous
RL: USES (Uses)
(sheets from, **elec. conductive** circuit **substrates** containing)
RN 9002-88-4 HCAPLUS
CN Ethene, homopolymer (CA INDEX NAME)

CM 1

CRN 74-85-1
CMF C2 H4

$H_2C=CH_2$

RN 12597-68-1 HCAPLUS
CN Stainless steel (CA INDEX NAME)

*** STRUCTURE DIAGRAM IS NOT AVAILABLE ***

L93 ANSWER 22 OF 23 HCAPLUS COPYRIGHT 2007 ACS on STN
AN **1986:522877** HCAPLUS
DN 105:122877
TI Protective properties of metallic and metal-**polymer coatings**
AU Kupriyanov, I. L.; Korotkina, M. N.; Ivashko, V. S.; Verstak, A. A.; Sokhadze, V. Sh.
CS Beloruss. Resp. Nauchno-Proizvod. Ob'edin. Poroshk. Metall., Minsk, USSR
SO Zashchita Metallov (**1986**), 22(4), 551-4
CODEN: ZAMEA9; ISSN: 0044-1856
DT Journal
LA Russian
AB **Electrochem**. methods were used to evaluate the protective properties of spray **coatings** of **stainless steel** clad, for example, with a high-pressure modified

polyethylene film. The **polymer** film, plastically
filling the continuous **pores** of the metallic layer, provides
effective protection and high corrosion resistance of the material even in
the case of damage to the outer **polymer** layer. The
steel St.3 [39296-41-8] was spray-**coated** with the metal
to a thickness of 0.1-0.4 mm and with the **polymers** to 0.2 mm.
The **steel coating** was Kh18N9TYu [104234-05-1] and the
polymers were Pentaplast [26917-50-0] and high-pressure
polyethylene [**9002-88-4**].

CC 72-6 (Electrochemistry)
Section cross-reference(s): 38, 42, 55

ST protective **coating** metal **polymer**; corrosion prevention
steel polymer coating

IT **Coating** materials
(metallic and metal-**polymer**, protective properties of)

IT **Electrolytic** polarization
(of **steel coated** with metals or metal-
polymer coatings in sulfate **solns.**)

IT **9002-88-4** 26917-50-0
RL: PRP (Properties)
(**coatings** of, with metal, protective properties of)

IT 104234-05-1
RL: PRP (Properties)
(**coatings** of, with **polymer**, protective properties
of)

IT 39296-41-8, reactions
RL: PEP (Physical, engineering or chemical process); PROC (Process)
(corrosion of, metallic and metal-**polymer coatings**
in prevention of)

IT 7664-93-9, properties 7783-20-2, properties
RL: PRP (Properties)
(**electrolytic** polarization of **steel coated**
with metals or metal-**polymer coatings** in
solution containing)

IT **9002-88-4**
RL: PRP (Properties)
(**coatings** of, with metal, protective properties of)

RN 9002-88-4 HCAPLUS
CN Ethene, homopolymer (CA INDEX NAME)

CM 1

CRN 74-85-1
CMF C2 H4

$H_2C=CH_2$

L93 ANSWER 23 OF 23 HCAPLUS COPYRIGHT 2007 ACS on STN
AN **1981:451801** HCAPLUS
DN 95:51801
TI Cell for **electrolysis** of brines for producing chlorine
IN Dubois, Donald Wayne; Darlington, William Bruce
PA PPG Industries, Inc. , USA
SO Ger. Offen., 32 pp.
CODEN: GWXXBX
DT **Patent**
LA German

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	DE 3041844	A1	19810527	DE 1980-3041844	19801106 <--
	DE 3041844	C2	19870319		
	US 4342629	A	19820803	US 1979-76898	19791108 <--
	US 4315805	A	19820216	US 1980-120217	19800211 <--
	NL 8005092	A	19810601	NL 1980-5092	19800910 <--
	SE 8006868	A	19810509	SE 1980-6868	19801001 <--
	NO 8002980	A	19810511	NO 1980-2980	19801007 <--
	JP 56075585	A	19810622	JP 1980-154736	19801105 <--
	JP 56112490	A	19810904	JP 1980-154737	19801105 <--
	FR 2469473	A1	19810522	FR 1980-23765	19801106 <--
	FR 2469473	B1	19851025		
	BE 886072	A1	19810507	BE 1980-202727	19801107 <--
	GB 2063918	A	19810610	GB 1980-35988	19801110 <--
	US 4364815	A	19821221	US 1981-276123	19810622 <--
	US 4448662	A	19840515	US 1983-496031	19830519 <--
	CA 1207277	A2	19860708	CA 1985-475357	19850227 <--
PRAI	US 1979-76898	A	19791108 <--		
	US 1980-120217	A	19800211 <--		
	CA 1980-362980	A3	19801022 <--		
	US 1982-382450	A1	19820524 <--		

AB In this cell a permionic membrane seps. the anode from the cathode. A chlor-alkali cell with a solid **polymer electrolyte** was constructed with a thermoplastic permionic membrane having attached on opposite sides anodic and cathodic catalysts which were on screens. The solid **polymer electrolyte** was made by **deposition** of Pt black on a foil of **Flemion**, a **perfluoronated** hydrocarbon resin with Me ester acid groups. After pressing the **polymer** was boiled in 30% NaOH **solution** for 24 h. This membrane was used with a Ni-**plated stainless steel** screen cathode and a RuO2-TiO2 **coated** screen as the anodic catalyst carrier on the **uncoated surface** of the membrane. Brine was **electrolyzed** at 3.03 V for 50 min.

IC C25B0001-26

CC 72-10 (Electrochemistry)
Section cross-reference(s): 49, 67

ST permionic membrane **electrolytic cell** brine; sodium hydroxide chlorine **electroprodn** brine

IT Brines
(**electrolysis** of, membrane cells for)

IT **Electrolytic cells**
(diaphragm, for brine **electrolysis**)

IT 12036-10-1 13463-67-7, uses and miscellaneous
RL: CAT (Catalyst use); USES (Uses)
(catalysts, on anode for brine **electrolysis**)

IT 7440-02-0, uses and miscellaneous
RL: USES (Uses)
(cathodes, from **stainless steel** screen, for brine **electrolysis**)

IT 1310-73-2P, preparation 7782-50-5P, preparation
RL: PREP (Preparation)
(manufacture of, by brine **electrolysis**, membrane cells for)

IT **75634-46-7**
RL: PRP (Properties)
(membranes, for brine **electrolysis**)

IT **75634-46-7**
RL: PRP (Properties)
(membranes, for brine **electrolysis**)

RN 75634-46-7 HCAPLUS
CN Flemion (CA INDEX NAME)

*** STRUCTURE DIAGRAM IS NOT AVAILABLE ***

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L131 ANSWER 1 OF 20 WPIX COPYRIGHT 2007 THE THOMSON CORP on STN
AN 2005-103702 [12] WPIX
DNC C2005-034977 [12]
DNN N2005-090002 [12]
TI Manufacture of **electrolyte** for fuel cell used to power motors, lights, computers, or electrical **appliances**, comprises coupling **substrate** to charged **electrode** and **electrodepositing polymeric electrolyte** on **substrate**
DC A85; L03; X16; X25
IN HERMAN G S; MARDILOVICH P; PUNSALAN D
PA (HERM-I) HERMAN G S; (HEWP-C) HEWLETT-PACKARD DEV CO LP; (MARD-I) MARDILOVICH P; (PUNS-I) PUNSALAN D
CYC 35
PIA EP 1498976 A2 20050119 (200512)* EN 17[7]
JP 2005038858 A 20050210 (200512) JA 13
US 20050014050 A1 20050120 (200512) EN <--
ADT EP 1498976 A2 EP 2004-253574 20040615; **US 20050014050 A1 US 2003-620675 20030715**; JP 2005038858 A JP 2004-208178 20040715
PRAI **US 2003-620675 20030715**
AB EP 1498976 A2 UPAB: 20050708
NOVELTY - Manufacture of an **electrolyte** comprises coupling a **substrate** (250) to a charged **electrode** (240, 270) and **electrodepositing** a **polymeric electrolyte** on the **substrate**.

DETAILED DESCRIPTION - INDEPENDENT CLAIMS are also included for:
(a) an **electrolyte** comprising a **porous substrate**, and a **polymeric electrolyte electrodeposited** within the **porous substrate**;
(b) a fuel cell comprising a cathode, an anode and an **electrolyte**;
(c) an **electrochemical** apparatus comprising a housing, a fuel cell, and an **electrolyte**; and
(d) an **electronic** device comprising an **electrochemical** cell providing power to an electric power consuming apparatus, a fuel source, and a fuel flow path.
USE - For manufacturing an **electrolyte** for a fuel cell used to power motors, lights, computers, or electrical **appliances**
.
ADVANTAGE - The method reduces the likelihood of swelling, increases mechanical stability and reduces the possibility of methanol crossover.
DESCRIPTION OF DRAWINGS - The figure is a cross-sectional view illustrating an **electrodeposition** system.
Negative lead (220)
Charged **electrode** (240, 270)
Substrate (250)
Positive lead (280)

TECH
POLYMERS - Preferred Material: The **polymeric electrolyte** comprises a **perfluorosulfonate ionomer**.

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L131 ANSWER 2 OF 20  WPIX COPYRIGHT 2007      THE THOMSON CORP on STN
AN   2005-010039 [01]   WPIX
CR   2004-108521; 2007-395311
DNC  C2005-002815 [01]
TI   Functionalizing a porous substrate useful for
     improving material properties involves flash evaporating a monomer in a
     vacuum to produce a vapor; and condensing the vapor on the porous
     substrate to produce a film on the porous
     substrate
DC   A82; F06; F09; M13; P42; P73
IN   MIKHAEL M G; YIALIZIS A; MIKHAEL M
PA   (MIKH-I) MIKHAEL M G; (SIGM-N) SIGMA LAB ARIZONA INC; (YIAL-I) YIALIZIS A
CYC  107
PIA  US 20040213918  A1 20041028 (200501)* EN  16[9]
     WO 2004097846   A2 20041111 (200501)  EN
     EP 1618225      A2 20060125 (200608)  EN
     CN 1791701      A  20060621 (200672)  ZH
     JP 2006524759   W  20061102 (200672)  JA  22
     US 20060257642  A9 20061116 (200677)  EN
ADT  US 20040213918 A1 Provisional US 2003-465719P 20030425; US
     20040213918 A1 US 2004-830608 20040423; CN 1791701 A CN 2004-80011126
     20040423; EP 1618225 A2 EP 2004-760361 20040423; WO 2004097846 A2 WO
     2004-US12595 20040423; EP 1618225 A2 WO 2004-US12595 20040423; JP
     2006524759 W WO 2004-US12595 20040423; JP 2006524759 W JP 2006-513264
     20040423; US 20060257642 A9 Provisional US 2002-391864P 20020626
     ; US 20060257642 A9 Provisional US 2003-465719P 20030425; US
     20060257642 A9 CIP of US 2003-465399 20030619; US 20060257642 A9
     US 2004-830608 20040423
FDT  EP 1618225      A2 Based on WO 2004097846   A; JP 2006524759   W Based on
     WO 2004097846   A
PRAI US 2004-830608        20040423
     US 2003-465719P       20030425
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US 2002-391864P **20020626**
US 2003-465399 **20030619**

AB US 20040213918 A1 UPAB: 20050707

NOVELTY - Functionalizing (P1) a **porous substrate** to impart a particular functionality involves: flash evaporating a monomer having the functionality in a vacuum chamber to produce a vapor; condensing the vapor on the **porous substrate** to produce a film of the monomer on the **porous substrate**; and curing the film to produce a functionalized **polymeric** layer on the **porous substrate**.

DETAILED DESCRIPTION - Functionalizing (P1) a **porous substrate** to impart a particular functionality to the **substrate** while retaining its permeability, involves: flash evaporating a monomer having the functionality in a vacuum chamber to produce a vapor; condensing the vapor on the **porous substrate** to produce a film of the monomer on the **porous substrate**; and curing the film to produce a functionalized **polymeric** layer on the **porous substrate**. The condensing step is carried out under vapor-density and residence-time conditions that limit the **polymeric** layer to a maximum thickness of about 3 microns. An INDEPENDENT CLAIM is included for a **porous substrate** produced by (P1), where the monomer incorporates a hydrophilic and oleophilic functionality, a hydrophilic **electrostatic** dissipation functionality, a hydrophobic and oleophobic functionality, a color, a biocide functionality, a fire-resistant functionality, a metal-chelating functionality, a proton-conductivity functionality, an ion-conductivity functionality, a pH-sensing functionality, a scent-emission functionality.

USE - For improving material (e.g. paper, membranes, and other woven and non-woven **porous** materials) properties for particular **applications**.

ADVANTAGE - The method is safe to implement, do not utilize solvents, and do not effect the mechanical and functional properties of the **porous substrate**. The method controls the **surface** energy of the resulting product and introduces hydrophobicity, oleophobicity, hydrophilicity, oleophilicity, fire resistance, biocidicity, color, anti-stain, antistatic or sensor properties. The method is economical and cost-effective.

TECH

INORGANIC CHEMISTRY - Preferred Components: The inorganic layer is metals or ceramics (preferably metals to provide electrical conductivity, low-emissivity and **electrostatic** dissipation functionalities).
ORGANIC CHEMISTRY - Preferred Components: The inorganic layer is metals or ceramics (preferably metals to provide electrical conductivity, low-emissivity and **electrostatic** dissipation functionalities).
POLYMERS - Preferred Method: The method further involves pretreating the **substrate** in a plasma field within one second prior to the condensation step; vacuum **depositing** an inorganic layer over the **polymeric** layer; flash evaporating and condensing a second film of monomer on the inorganic layer; and curing the second film to produce a second **polymeric** layer on the inorganic layer. The method further involves: co-**depositing** metallic lithium over the monomer prior to the curing step to provide a **polymer electrolyte** with ion-conductivity functionality. The metal layer provides a low-emissivity functionality. Preferred components: The **porous substrate** comprises a **porous** material selected from **polypropylene**, **polyethylene**, **fluoro-polymers**, **polyester**, nylon, rayon, paper, wool, cotton, glass fibers, carbon fibers, cellulose-based fibers, and metals. The monomer is a **fluorinated** monomer to provide

water and oil repellency functionality. The monomer comprises a color additive, a biocide additive, a brominated monomer to provide a fire retardant functionality, an acrylated acetyl acetonate monomer to provide a metal-chelating functionality, a **sulfonic** acid group to provide proton-conductivity functionality. The monomer is functionalized with a functional group selected from hydroxyl, carboxyl, **sulfonic** , amino, amido, or ether to provide a hydrophilic functionality. The **porous substrate** is with increased wet tensile strength; increased chemical resistance; increased abrasion resistance; and reduced friction coefficient; and is with two sides and corresponding opposite functionalities.

ABEX EXAMPLE - A melt-blown **polypropylene** nonwoven fabric was **coated** with a hydrophilic acrylate **polymer** film functionalized with hydroxyl, carboxyl, **sulfonic**, amino, amido and ether groups (in separate tests) to create a water absorbent **surface**. The monomer was flash evaporated at 10 millitorr. The fabric was pretreated in a plasma field and within one second it was exposed to the monomer vapor for condensation while traveling at a speed of 30 meters/minute. The condensed monomer layer was cured in-line by **electron** beam radiation within 150 milliseconds. A **polymer coating** thickness of 0.1 microns resulted from the run, which was found to provide adequate wettability in all cases by water with a **surface** energy of 70 - 72 dyne/cm. The functionalized fabrics absorbed water while retaining the original permeability of the fabrics. The **coated** materials showed high performance as water absorbent media.

L131 ANSWER 3 OF 20 WPIX COPYRIGHT 2007 THE THOMSON CORP on STN
AN 2004-619278 [60] WPIX
DNC C2004-223061 [60]
DNN N2004-489964 [60]
TI Solid **polymer electrolyte** for fuel cell, is mixture containing **polymer** having anionic group, and **polymer** having amide group or alkoxy amide group in principal chain
DC A23; A85; L03; X12; X16
IN KIDAI M; KONO S; TAGUCHI S
PA (TORA-C) TORAY IND INC
CYC 1
PIA JP 2004235051 A 20040819 (200460)* JA 23[5]
ADT JP 2004235051 A **JP 2003-23197 20030131**
PRAI **JP 2003-23197 20030131**
AB JP 2004235051 A UPAB: 20050907

NOVELTY - A solid **polymer electrolyte** is a mixture containing **polymer** having anionic group and **polymer** having amide group or alkoxy amide group in principal chain.

DETAILED DESCRIPTION - A solid **polymer electrolyte** is a mixture containing **polymer** (A) having anionic group and **polymer** (B) having amide (-CONH-) group or alkoxy amide group (-CONR-) in principal chain.

INDEPENDENT CLAIMS are also included for the following:

(1) solid-**polymer-electrolyte** film containing solid **polymer electrolyte** packed in a **porous** base material; and

(2) fuel cell using the solid-**polymer-electrolyte** film.

USE - For fuel cell (claimed), **electrolysis** apparatus and **electrolyzer**. The fuel cell is used as electric power supply source for motor vehicles such as passenger car, bus, truck, ship, train, and household **appliances** such as mobile telephone, personal computer, and PDA.

ADVANTAGE - The solid **polymer electrolyte** has high ionic conductivity and output, which is maintained for long period of time. Highly efficient fuel cell is provided using the solid **polymer electrolyte**.

DESCRIPTION OF DRAWINGS - The figure shows the isometric view of solid-**polymer-electrolyte** film.

Porous portion (1)

Non-**porous** portion (2)

TECH

POLYMERS - Preferred Composition: The **polymer** (A) having anionic group, is the **polymer** having -SO3H or -SO3X (where, X is alkali metal). The **polymer** (B) having -CONH- group in the principal chain, is the **polymer** chosen from group of formula (1), and/or their **copolymers**. Preferably, the **polymer** (B) having -CONR- group (where, R is alkoxy) or -CONH- group in the principal chain, is a mixture of alkoxy **polyamide** and **polyamide**. The **polymer** (B) is a layered silicate-**polymer** composite, which contains **polymer** (B) in interlayer.

n = degree of **polymerization.**

ORGANIC CHEMISTRY - Preferred Fuel: The fuel cell uses aqueous solution of methanol as fuel.

ABEX EXAMPLE - 20.5 wt.% solution of **Nafion** was mixed with ethanol solution of **copolymer** of nylon 6/nylon 66, in weight ratio of 10/1. The obtained mixture was **coated** on a **polyester** film, and subsequently dried at 100degreesC for 20 minutes. Then, the **polyester** film was peeled, to obtain solid **polymer electrolyte** film of 150 mum thickness. The output and ionic conductivity of the obtained solid **polymer electrolyte** film was measured in MCO, and found to be 1.4 mumol/cm2/minute and 4.9 S/cm2, respectively. The output of the solid **polymer electrolyte** film in film-**electrode** composite (MEA), was measured after 1 day, 3 days, 10 days and 30 days, and found to be 6.8 mW/cm2, 7.7 mW/cm2, 8.3 mW/cm2 and 8.2 mW/cm2, respectively.

L131 ANSWER 4 OF 20 WPIX COPYRIGHT 2007 THE THOMSON CORP on STN
AN 2004-432715 [41] WPIX
DNC C2004-162203 [41]
DNN N2004-342013 [41]
TI Flexible membrane for fuel cells, e.g. for cars or domestic systems, comprises a **porous** composite support filled with **polymer electrolyte**, a **porous substrate** of glass or **polymer** fibres, and a **porous** ceramic **coating**
DC A18; A23; A26; A85; L03; X16
IN HENNIGE V; HOERPEL G; HYING C
PA (CREA-N) CREAVIS GES TECHNOLOGIE & INNOVATION MBH
CYC 1
PIA DE 10254732 A1 20040603 (200441)* DE 20[0]
ADT DE 10254732 A1 **DE 2002-10254732 20021123**
PRAI **DE 2002-10254732 20021123**
AB DE 10254732 A1 UPAB: 20050530

NOVELTY - Fuel cell membrane which is impermeable to the reaction components comprises a flexible, permeable composite support in which the **pores** are 75% filled with a proton-conducting **polymer electrolyte**, a flexible **porous** two-dimensional **substrate** made of woven and/or non-woven glass or **polymer** fibres, and a **porous** ceramic **coating**.

DETAILED DESCRIPTION - Dimensionally-stable, proton-conducting, flexible membrane (FM) for fuel cells which is impermeable to the reaction components in fuel cell reactions, comprising a flexible, permeable

composite support, a flexible **substrate** with a large number of openings and a **coating** in this **substrate**. The **substrate** material consists of woven and/or non-woven glass or **polymer** fibres, the **coating** is a **porous** ceramic **coating** and the **pores** in the support are filled to at least 75% with a proton-conducting **polymer electrolyte**. INDEPENDENT CLAIMS are also included for

(a) a method (M1) for the production of FM by infiltrating **electrolyte**(s) or **polymer electrolyte**(s) or precursors thereof into the **pores** of the support as above

(b) a flexible membrane-**electrode** unit (MEU) for fuel cells, with conductive anode and cathode layers on either side of FM

(c) a method (M2) for the production of MEU by making FM as above, preparing a material for the production of **electrode** layers (proton-conductive component, catalyst (or precursor) for the anode or cathode reaction, optionally a catalyst support and optionally a **pore**-former), **coating** this material onto each side of the membrane (FM) and producing a strong bond between the **coatings** and the membrane, with the formation of a **porous**, proton-conducting anode or cathode layer

(d) fuel cells containing FM or MEU

(e) mobile or stationary systems with an MEU, fuel cell or fuel cell stack containing FM or MEU as above.

USE - In fuel cells, direct-methanol fuel cells and reformate fuel cells, or for the production of membrane-**electrode** units, fuel cells or fuel cell stacks (claimed); also claimed is the use of membrane-**electrode** units containing these **electrolyte** membranes in the **applications** listed above. **Applications** include mobile and stationary fuel cells for cars and domestic energy systems.

ADVANTAGE - A dimensionally-stable, proton-conducting, flexible membrane which shows almost no change in volume after swelling or drying (in spite of the necessary swelling), combined with good conductivity and good long-term stability (especially because of the reduced risk of washing out the **electrolyte**). This system combines the advantages of **polymer electrolytes** (water-resistance, long-term stability, high conductivity) with those of flexible ceramic membranes (dimensional stability, high **porosity**, flexibility).

TECH

POLYMERS - Preferred Membrane: FM with a thickness of 10-150 microns, a bending radius of down to 5000 m (preferably down to 2 mm) and a conductivity (in the swollen state) of at least 5 (preferably at least 50) mS/cm, stable up to a temperature of at least 80degreesC. Preferred Units: Membrane-**electrode** units which can be operated at a temperature of at least 80 (preferably at least 120) degreesC and will tolerate a bending radius as above. Proton-conducting material of the same composition is used in the anode and cathode layers and the **electrolyte** membrane. Different catalysts are used in the anode and cathode layers, and the catalyst support in these layers is electrically conductive. Preferred Components: **Polymer electrolytes** (PE) comprise **Nafion** (RTM), **sulfonated** or phosphonated, **fluorinated** or **unfluorinated polyolefins**, **polyethers**, **polystyrenes**, **polysulfones**, **polyphenylsulfones**, **polyimides**, **polyoxazoles**, **polytriazoles**, **polybenzimidazoles**, **polyether**-ether-ketones or **polyether**-ketones. Preferred supports comprise woven fabric with a mesh width of 5-500 microns or non-woven with a thickness of 5-100 microns, consisting of fibres with a thickness of 0.5-150 microns, preferably aluminosilicate glass fibres with at least 60 wt% SiO_2 and at least 10 wt% Al_2O_3. The **substrate** consists of non-woven fabric

based on **polymer** fibres, preferably **polyacrylonitrile**, **polyamide**, PVDF, PTFE, **polyolefin** and/or **polyimide** fibres. Preferred Methods: M1 involves infiltrating the **pores** of the support with molten PE and solidifying the melt, or infiltrating with a 2.5-50 vol% solution of PE and drying the solution at up to 250degreesC, or infiltrating with precursors of ion-conducting **polymers** and then **polymerising**/crosslinking these in the **pores**. Suitable solvents for PE solutions comprise alcohols, hydrocarbons, ethers, esters, ketones, aldehydes and/or water. Infiltration/drying may be repeated several times, and infiltration may be carried out (possibly as a continuous process) by printing, pressing on or in, roller-**coating**, spreading, **painting**, dip-**coating**, spraying or pouring onto the support. M2 involves (A) pressing the **electrode** layer materials onto the membrane and forming a strong bond by heating at 20-300 (preferably 80-150) degreesC, or (B) **coating** the **electrode** material onto a supporting membrane (preferably of PTFE), drying the **coating**, pressing the **coating** onto the membrane at 20-300 (preferably 8 0-150) degreesC and removing the supporting membrane (preferably by mechanical or chemical methods or by pyrolysis), or (C) using a method similar to (B) with carbon paper or electrically-conductive woven or non-woven fabric as the supporting membrane (which is not removed). The **electrode**-producing material contains a metal salt catalyst, preferably hexachloroplatinic acid, which is reduced on the membrane to form the required catalyst; an open-**pore** gas diffusion **electrode**, preferably open-**pore** carbon paper, is then pressed onto the catalyst or fixed on the catalyst with a conductive adhesive. **Electrode** material may be **applied** repeatedly, optionally with a drying step (preferably at up to 300degreesC) between each **application**, preferably in a continuous manner onto the membrane (FM) or a flexible supporting membrane taken from a roll of material.

INORGANIC CHEMISTRY - Preferred **Porous Coating**: Particles of aluminum, silicon, zirconium and/or titanium oxide(s).

ELECTRICAL POWER AND ENERGY - Preferred **Applications**: Systems containing these units and fuel cells comprise vehicles (mobile units) and domestic energy systems (stationary).

ABEX EXAMPLE - A mixture of 130 g water and 30 g ethanol was treated with 30 g 5 wt% aqueous nitric acid, 10 g tetraethoxysilane, 2.5 g methyltriethoxysilane and 7.5 g Dynasilan AMEO (RTM: 3-aminopropyltriethoxysilane), then the sol obtained was stirred for a few hours, treated with 145 g MZS1 (RTM) and 145 g MZS3 (RTM), homogenised for at least 48 hours in a closed vessel and filtered to form a fine slurry. Commercial **polyacrylonitrile** non-woven (thickness 15 microns) was **coated** with the slurry by a continuous roller process at 280degreesC with a belt speed of 24 m/h, to give a composite support (S450PAN) with a average **pore** size of 450 nm and a thickness of 30 microns. This support was infiltrated with a 7.5 wt% commercial solution of **Nafion** (RTM) and dried for 15 minutes at 100degreesC to render the **Nafion** (RTM) insoluble in water; this process was repeated 6 times to give a moist gas-tight membrane with a BP of more than 6 bar, a Gurley number of more than 1500, a longitudinal expansion of less than 1% in all directions after swelling in water at room temperature and a conductivity of 35 mS/cm (swollen membrane; thickness = 40 microns). A membrane-**electrode** unit for a fuel cell was made by screen-printing the membrane on both sides with ink containing carbon black, catalyst, **Nafion** (RTM) and an alcohol mixture, and then drying each **coating** at 120degreesC to form anode and cathode layers. Fuel cells containing these units were very reliable in operation, showing very good long-term stability and little adverse effect on

performance after drying out and re-wetting.

L131 ANSWER 5 OF 20 WPIX COPYRIGHT 2007 THE THOMSON CORP on STN
AN 2004-248288 [23] WPIX
CR 2004-246919
DNC C2004-097051 [23]
DNN N2004-196984 [23]
TI Plating a **nanoporous** metal membrane for membrane **electrode** assembly, has freely supporting portion of **nanoporous** metal membrane on metal plating solution having plating metal(s), and contacting metal plating solution with reducing agent
DC A85; A88; L03; M11; M13; P42; P53; P73; X16; X25
IN DING Y; ERLEBACHER J
PA (DING-I) DING Y; (ERLE-I) ERLEBACHER J; (UYJO-C) UNIV JOHNS HOPKINS
CYC 103
PIA WO 2004021481 A1 20040311 (200423)* EN 35[8]
AU 2003261462 A1 20040319 (200462) EN
US 20050112432 A1 20050526 (200535) EN
ADT WO 2004021481 A1 WO 2003-US24808 20030827; US 20050112432 A1 Provisional **US 2002-406065P 20020827**; US 20050112432 A1 US 2003-647436 20030826; AU 2003261462 A1 AU 2003-261462 20030827
FDT AU 2003261462 A1 Based on WO 2004021481 A
PRAI US 2003-647436 20030826
US 2002-406065P 20020827
AB WO 2004021481 A1 UPAB: 20060121
NOVELTY - Plating a **nanoporous** metal membrane (10) comprises freely supporting a portion of **nanoporous** metal membrane on a metal plating solution (14) comprising at least one plating metal; and contacting the metal plating solution with a reducing agent, thus plating a portion of the **nanoporous** metal membrane with the at least one plating metal.

DETAILED DESCRIPTION - INDEPENDENT CLAIMS are also included for:

(a) a plated article comprising a **nanoporous** metal membrane; and a plating layer comprising at least one metal constituent formed on at least a portion of the **nanoporous** metal membrane;

(b) a membrane **electrode** assembly comprising a **polymer electrolyte** membrane; and a **nanoporous** metal membrane adhered to at least one **surface** of the **polymer electrolyte** membrane, where the **nanoporous** metal membrane comprises a plating layer comprising at least one metal; and

(c) a fuel cell comprising a membrane **electrode** assembly.

USE - For plating a **nanoporous** metal membrane for membrane **electrode** assembly used for fuel cell (claimed).

ADVANTAGE - The method consumes a minimum amount of plating material. It does not subject the fragile object to be plated to mechanical shocks and loads.

DESCRIPTION OF DRAWINGS - The figure shows a rigid **substrate** with an adhered **nanoporous** metal membrane being inserted into a metal plating solution.

Nanoporous metal membrane (10)
Substrate (12)
Metal plating solution (14)
Container (16)

TECH
METALLURGY - Preferred Parameter: The plating layer has a thickness of 1-5 nm. The plating layer has a loading density of less than 0.1 (preferably 0.005) mg/cm2. The **nanoporous** metal membrane has a thickness of less than 500 (preferably less than 100) mum. Preferred Component: The **nanoporous** metal membrane comprises gold. The plating layer

comprises at least one precious metal from platinum, iridium, rhodium, ruthenium, palladium, cobalt and/or silver. Preferred Method: The method further comprises contacting a portion of the **nanoporous** metal membrane with at least one thiol prior to freely supporting at least a portion of the **nanoporous** metal membrane on a metal plating solution. The **surface** of the **nanoporous** metal membrane is plated with the at least one plating metal continuously.
POLYMERS - Preferred Component: The **polymer electrolyte** membrane comprises **perfluorinated sulfonic** acids or **polystyrene sulfonate**.
ORGANIC CHEMISTRY - Preferred Material: The thiol is CH3(CH2)11-SH and/or CH3(CH2)18-SH.
INORGANIC CHEMISTRY - Preferred Composition: The metal plating solution comprises 2-20 g/L Na2Pt(OH)6.
ABEX SPECIFIC COMPOUNDS - The reducing agent is hydrazine.

L131 ANSWER 6 OF 20 WPIX COPYRIGHT 2007 THE THOMSON CORP on STN
AN 2004-202496 [19] WPIX
CR 2006-135636
DNC C2005-214374 [73]
DNN N2005-577360 [73]
TI Metal-**coated polymer electrolyte** membrane for fuel cell assembly comprises wave-like **surface** microstructure having crests and troughs, reinforcement wires, and metal film **deposited** on top of **surface** microstructure
DC A85; L03; X16
IN JEON Y; PAN A I
PA (HEWP-C) HEWLETT-PACKARD DEV CO LP; (JEON-I) JEON Y; (PANA-I) PAN A I
CYC 104

PIA	US 20040028973	A1	20040212	(200419)*	EN	11[5]
	WO 2004015804	A2	20040219	(200419)	EN	
	AU 2003258122	A1	20040225	(200456)	EN	
	EP 1527495	A2	20050504	(200530)	EN	
	JP 2005535098	W	20051117	(200576)	JA	13
	US 6977009	B2	20051220	(200601)	EN	
	AU 2003258122	A8	20051110	(200634)	EN	

ADT US 20040028973 A1 **US 2002-212720 20020807**; AU 2003258122 A1 AU 2003-258122 20030807; EP 1527495 A2 EP 2003-784962 20030807; WO 2004015804 A2 WO 2003-US24649 20030807; EP 1527495 A2 WO 2003-US24649 20030807; JP 2005535098 W WO 2003-US24649 20030807; JP 2005535098 W JP 2004-527800 20030807; AU 2003258122 A8 AU 2003-258122 20030807
FDT AU 2003258122 A1 Based on WO 2004015804 A; EP 1527495 A2 Based on WO 2004015804 A; JP 2005535098 W Based on WO 2004015804 A; AU 2003258122 A8 Based on WO 2004015804 A
PRAI **US 2002-212720 20020807**
AB US 20040028973 A1 UPAB: 20060203
NOVELTY - A metal-**coated polymer electrolyte** membrane (101) (PEM) comprises wave-like **surface** microstructure (300) with crests (303) and troughs (305), reinforcement wires (301) embedded in membrane, and metal film (307) **deposited** on top of **surface** microstructure. The reinforcement wires have young's modulus that is greater than young's modulus of membrane.
DETAILED DESCRIPTION - A metal-**coated polymer electrolyte** membrane (PEM) comprises wave-like **surface** microstructure with crests and troughs, reinforcement wires embedded in membrane, and metal film **deposited** on top of **surface** microstructure. The reinforcement wires have young's modulus that is greater than young's modulus of membrane. They are positioned parallel to the troughs of wave-like **surface** structure. The metal film is permeable only to protons and hydrogen. An INDEPENDENT CLAIM is also

included for a fuel cell assembly comprising anode, cathode, metal-**coated** PEM connecting the anode and the cathode, and fuel.

USE - For fuel cell assembly (claimed).

ADVANTAGE - The invention controls membrane expansion and prevents cracking in the metal **coating**.

DESCRIPTION OF DRAWINGS - The figure depicts a **polymer electrolyte** membrane reinforced with wires.

Metal-**coated polymer electrolyte** membrane (101)

Wave-like **surface** microstructure (300)

Reinforcement wires (301)

Crests (303)

Troughs (305)

Metal film (307)

TECH

POLYMERS - Preferred Component: The PEM is **sulfonated** derivative of **polymer** from **polysulfone**, **polyimide**, **polyphenylene** oxide, **polyphenylene sulfoxide**, **polyphenylene sulfide**, **polyparaphenylene**, **polyphenylquinoxaline**, **polyarylketone**, **polyetherketone**, **polyetheretherketone** (PEEK), **polyetherketone**-ketone, **polyetheretherketone**-ketone, **polyetherketoneetherketone** -ketone, **polybenzazole**, **polybenzimidazole** (PBI), or **polyaramid polymers**. It is a composite membrane having multiple layers of PEMs. The multiple layers of PEMs include blended **polymer** membranes, and/or unblended **polymer** membranes. The composite membrane is **Nafion** or PBI membrane **coated** with **sulfonated** PEEK. The membrane has first and second sides. The fuel cell assembly further includes PEM-**electrode** structure having PEM and **porous electrodes**. Preferred Property: The reinforcement wires have a young's modulus that is at least100-times greater than young's modulus of membrane.

INORGANIC CHEMISTRY - Preferred Component: The metal film comprises metal or alloy from palladium, neodymium, vanadium, iron, tantalum, or their alloys. The metal film comprises first metal layer covered with second metal layer. The first metal layer comprises material from neodymium, vanadium, iron, tantalum, or their alloys. The second metal layer comprises material from palladium, platinum, or their alloys. The metal film is further **coated** with a catalyst from platinum, platinum alloy, platinum black, or palladium black.

L131 ANSWER 7 OF 20 WPIX COPYRIGHT 2007 THE THOMSON CORP on STN
AN 2004-178828 [17] WPIX
DNC C2004-070810 [17]
DNN N2004-142152 [17]
TI Production of metal-**coated polymer electrolyte** membrane for fuel cell, involves **depositing** metal film permeable to protons and hydrogen, on micro textured **surface** of **polymer electrolyte** membrane
DC A85; G02; L03; X16
IN JEON Y; PAN A I
PA (HEWP-C) HEWLETT-PACKARD DEV CO LP; (JEON-I) JEON Y; (PANA-I) PAN A I
CYC 103

PIA	US 20030235737	A1	20031225	(200417)*	EN	20[11]
	WO 2004001876	A2	20031231	(200417)	EN	
	AU 2003243706	A1	20040106	(200447)	EN	
	EP 1525639	A2	20050427	(200529)	EN	
	JP 2005530330	W	20051006	(200566)	JA	18
	AU 2003243706	A8	20051110	(200634)	EN	

ADT US 20030235737 A1 **US 2002-173825 20020619**; AU 2003243706 A1 **AU 2003-243706 20030619**; EP 1525639 A2 **EP 2003-761214 20030619**; WO 2004001876 A2 **WO 2003-US19608 20030619**; EP 1525639 A2 **WO 2003-US19608 20030619**; JP 2005530330 W **WO 2003-US19608 20030619**; JP 2005530330 W **JP 2004-516065 20030619**; AU 2003243706 A8 **AU 2003-243706 20030619**

FDT AU 2003243706 A1 Based on WO 2004001876 A; EP 1525639 A2 Based on WO 2004001876 A; JP 2005530330 W Based on WO 2004001876 A; AU 2003243706 A8 Based on WO 2004001876 A

PRAI **US 2002-173825 20020619**

AB US 20030235737 A1 UPAB: 20060121

NOVELTY - A mold having micro textured **surface** is fabricated. Microstructure is produced on the **surface** of a **polymer electrolyte** membrane (PEM) (10) using the micro textured mold. A metal film (103) is **deposited** on the micro textured **surface** (107) of PEM, to obtain a metal-**coated** PEM. The metal film is permeable to protons and hydrogen.

DETAILED DESCRIPTION - INDEPENDENT CLAIMS are included for the following:

(1) metal-**coated polymer electrolyte** membrane;

(2) **electrolyte** membrane; and

(3) fuel cell assembly.

USE - For producing metal-**coated** PEM used for **electrochemical** devices such as fuel cell (claimed).

ADVANTAGE - The production method provides **polymer electrolyte** membrane (PEM) having excellent electrical resistance and ion conductivity. PEM is chemically stable to acids and free radicals, thermally or hydrolytically stable, and has low permeability to fuel, gas or impurities. The thin metal film relieves **surface** tension, expansion induced cracking of metal film and expansion-reduced stress. The **porous** metal layer increases reaction **surface** area, reaction rate and provides mechanical interlocking between the metal film and PEM. Fuel, gas and impurity crossover in fuel cell **applications**, are prevented.

DESCRIPTION OF DRAWINGS - The figure shows the changes of continuality of a thin metal film under **polymer electrolyte** membrane expansion.

polymer electrolyte membrane (101)
metal film (103)
micro textured **surface** (107)
protrusions (108)

TECH

POLYMERS - Preferred Component: The **polymer electrolyte** membrane is a **sulfonated** derivative of a **polymer** such as **polysulfone, polyimide, polyphenylene** oxide, **polyphenylene sulfoxide, polyphenylene sulfide, polyparaphenylene, polyphenyl** quinoxaline, **polyaryl** ketone, **polyether** ketone, **polyether** ether ketone (PEEK), **polyether** ketone-ketone, **polyether** ether ketone-ketone (PEEKK), **polyether** ketone ether ketone-ketone (PEKEKK), **polybenzazole** (PBZ), **polybenzimidazole** (PBI) or **polyaramid polymer**. PEM is a blended **polymer** or a composite membrane, which is **Nafion coated** with **sulfonated** PEEK, and a PBI membrane **coated** with **sulfonated** PEEK.

METALLURGY - Preferred Metal Film: The metal film comprises a metal or an alloy selected from palladium, platinum, niobium, vanadium, iron, tantalum, and their alloys, preferably palladium, niobium, vanadium, iron,

tantalum, and their alloys.

L131 ANSWER 8 OF 20 WPIX COPYRIGHT 2007 THE THOMSON CORP on STN
AN 2004-141738 [14] WPIX
DNC C2004-056652 [14]
DNN N2004-113069 [14]
TI Hydrophobic fibrous carbon gas diffusion backing for manufacture of membrane **electrode** or fuel cell, has **porous**, conductive sheet material treated with partially **fluorinated polymer** from (meth)acrylic- and/or urethane **polymers**
DC A14; A28; A85; L03; X16
IN BUXTON; BUXTON L W; FITZGERALD P H; REICHERT D L
PA (BUXT-I) BUXTON L W; (DUPO-C) DU PONT DE NEMOURS & CO E I; (FITZ-I) FITZGERALD P H; (REIC-I) REICHERT D L
CYC 33
PIA US 20030219645 A1 20031127 (200414)* EN 10[2]
EP 1378952 A1 20040107 (200414) EN
JP 2003323898 A 20031114 (200414) JA 12
ADT US 20030219645 A1 Provisional **US 2002-374926P 20020422**; US 20030219645 A1 **US 2003-413184 20030414**; EP 1378952 A1 **EP 2003-252448 20030417**; JP 2003323898 A **JP 2003-115633 20030421**
PRAI **US 2003-413184 20030414**
US 2002-374926P 20020422
AB US 20030219645 A1 UPAB: 20050528
NOVELTY - A hydrophobic fibrous carbon gas diffusion backing (GDB) comprises a **porous**, conductive sheet material treated with a partially **fluorinated polymer** from (meth)acrylic **polymers** and/or urethane **polymers**.
DETAILED DESCRIPTION - INDEPENDENT CLAIMS are also included for:
(a) a method for forming a hydrophobic fibrous carbon GDB; and
(b) a method for making a membrane **electrode** assembly (MEA) (30) comprising providing a **fluorinated** solid **polymer electrolyte** membrane having two sides, forming two catalyst layers on the two sides of the **fluorinated** solid **polymer electrolyte** membrane to form a catalyst **coated** membrane, and providing two hydrophobic fibrous carbon gas diffusion backings adjacent the two catalyst layers of the catalyst **coated** membrane.
USE - For making of MEA or fuel cell (claimed).
ADVANTAGE - The method provides a simplified, economical process for producing GDBs and MEAs that does not require a long, complicated sintering of the **fluoropolymers** at undesirably high temperatures not employ expensive amorphous **fluoropolymer** solutions.
DESCRIPTION OF DRAWINGS - The figure is a schematic illustration of the single cell test assembly employed in evaluating the performance of the GDB.
GDB (13)
MEA (30)
TECH
POLYMERS - Preferred Component: The **porous** conductive sheet material is paper or cloth made from woven or non-woven carbon fiber. A **microporous** layer **coating** of carbon particles and a hydrophobic binder are included. The binder is unhydrolyzed **perfluoro ionomer** resin or **polyvinylidene difluoride**. The partially **fluorinated polymer** comprises **fluorinated** alkyl side chains with a length of 4-20C. It comprises at least60% of a **fluorinated** acrylate, methacrylate or urethane monomer. It is **applied** by dipping, spraying or padding. The **fluorinated** alkyl side chains are of structure CF3-(CF2)n-X-. A **fluorinated** solid **polymer**

electrolyte membrane and catalyst layer(s) in ionic conductive contact with the membrane are included. The **fluorinated** solid **polymer electrolyte** membrane is a per **fluorinated sulfonic** acid **polymer** membrane. It is also a reinforced per **fluorinated** ion exchange membrane from expanded-**polytetrafluoroethylene** with an ion exchange **polymer**. The ion exchange **polymer** is a per **fluorinated sulfonic** acid **polymer**. The two catalyst layers comprise a noble metal catalyst and an **ionomeric** resin binder.
n = 3-17;
X = bridging group, preferably -(CH2)p-, or -SO2-NR-;
p = 1-6;
R = CH3-, or CH3-CH2.

ABEX EXAMPLE - Carbon cloth, Zoltek, was treated with a **fluorinated polymeric surface** treating agent in a pad-bath **applicator**, which passes the fabric through an aqueous bath, and through squeeze rolls to give uniform treatment. Isopropanol (10 wt.%) was used to improve wetting. 77% Wet pick-up was obtained. Thus, with 3.3 wt.% of a bath of Zonyl 7040, 2000 ppm **fluorine** on the fabric was obtained. After treatment, the fabrics were dried (and cured) for 2 minutes at 300degreesF in a forced air oven for forming a GDB (13). The GDB repelled water and isopropanol. The conductivity was measured to be 71.9+/-2.3 S/cm.

L131 ANSWER 9 OF 20 WPIX COPYRIGHT 2007 THE THOMSON CORP on STN
AN 2004-108663 [11] WPIX
DNC C2004-044470 [11]
DNN N2004-086328 [11]
TI Laminated membrane for use for fuel cells consists of a membrane made of an aromatic **polymer electrolyte** having super-strong acid groups and a membrane made of **perfluoroalkylsulfonic** acid **polymer electrolytes**
DC A26; A85; L03; P73; X16
IN IWASAKI K; SHINODA H; YOSHIMURA K
PA (SUMO-C) SUMITOMO CHEM CO LTD
CYC 103

PIA	WO 2004004037	A1	20040108	(200411)*	JA	55[0]
	JP 2004025793	A	20040129	(200411)	JA	18
	JP 2004063301	A	20040226	(200416)	JA	14
	AU 2003242451	A1	20040119	(200447)	EN	
	JP 2004303541	A	20041028	(200471)	JA	9
	EP 1519435	A1	20050330	(200522)	EN	
	KR 2005013162	A	20050202	(200540)	KO	
	TW 2004000877	A	20040116	(200567)	ZH	
	CN 1666369	A	20050907	(200607)	ZH	
	US 20060166047	A1	20060727	(200650)	EN	

ADT WO 2004004037 A1 **WO 2003-JP7704 20030618**; JP 2004025793 A **JP 2002-189447 20020628**; JP 2004063301 A **JP 2002-220867 20020730**; JP 2004303541 A **JP 2003-94089 20030331**; AU 2003242451 A1 **AU 2003-242451 20030618**; CN 1666369 A **CN 2003-815282 20030618**; EP 1519435 A1 **EP 2003-733475 20030618** ; EP 1519435 A1 **WO 2003-JP7704 20030618**; TW 2004000877 A **TW 2003-116864 20030620**; KR 2005013162 A KR 2004-721298 20041227; US 20060166047 A1 **WO 2003-JP7704 20030618**; US 20060166047 A1 US 2004-519198 20041223
FDT AU 2003242451 A1 Based on WO 2004004037 A; EP 1519435 A1 Based on WO 2004004037 A
PRAI **JP 2003-94089 20030331**
JP 2002-189447 20020628

JP 2002-220867 20020730

AB WO 2004004037 A1 UPAB: 20060804

NOVELTY - A laminated membrane consisting of a membrane (I) made of an aromatic **polymer electrolyte** having super-strong acid groups and a membrane (II) made of a combination of one substance selected from **perfluoroalkylsulfonic** acid **polymer electrolytes** and a non-super-strong acid **polymer electrolyte**, is new.

USE - The laminated membrane is for use for **electrolyte** membranes for use in fuel cells.

ADVANTAGE - The laminated membrane has an excellent power generation performance and excellent mechanical strength.

TECH

ELECTRICAL POWER AND ENERGY - Preferred Membrane : In the membrane (I) the aromatic **polymer electrolyte** having super-strong acid groups is represented by general formula (1):

A = divalent aromatic group ;
A' = divalent aromatic group substituted with super-strong acid groups ;
Z, Z' = direct bond or divalent group ;
m = 10 - 100000 ; and
n = 0 - 100000.

In (1), A is a divalent aromatic group selected from groups represented by general formulae (3a) - (3c), and A' is a divalent aromatic group selected from groups represented by general formulae (3d) - (3g).

R = OH, 1-6C alkyl, 1-6C alkoxy, 7-12C aralkyl, aryl group or halogen atom ;
p, r, s, t = 0 - 4 ;
q = 0 - 6 ;
j = 0 or 1 ;
Y = direct bond or divalent group ;
Z, Y = direct bond or divalent group :approximately D = super-strong acid group ;
h, h, h' = 1 - 4 ;
s', t', r, t = 0 - 4 ;
(q'+ h') = 1 - 6 ;
j = 0 or 1

In (1), Z, Z' and Y are independently -O-, -S-, -CO-. -SO2-, 1-20C alkylene or 1-20C alkylenedioxy groups, and Z is -O-, -S-, -CO-. -SO2-, a 1-20C alkylene group, a 1-20C alkylenedioxy group, a 6-12C arylene group, a 6-12C aryloxy group or a 6-20C alkyleneoxy group in which all the hydrocarbon groups can be substituted with F atoms. The super-strong acid group is one group selected from groups represented by general formulae (2a) - (2d):

-G-SO3-W+ (2a)
-G-SO2N-W+SO2-E (2b)
-G-P(O)(O-W+)2 (2c)
-G-P(O)O-W+-E (2d)

G = alkylene, aralkylene or arylene group, which can be partially or wholly substituted with F atoms ;
W+ = positive ion ;
E = alkyl, aralkyl or aryl group, which can be partially or wholly substituted with F atoms

In (2a) - (2d), W is preferably H. A typical aromatic **polymer electrolyte** having super-strong acid groups is represented by general formula (4).

Ar1, Ar2 = divalent aromatic groups ;
a = 0, 1, 2 or 3 ;
X+ = H+, alkali ion or ammonium ion

A laminated membrane contains the membrane (II) as at least one outermost **surface** membrane, where the wt of membrane (II) is 0.1 - 50 wt%.

Another laminated membrane consists of a membrane comprising a **perfluoroalkylsulfonic** acid **polymer electrolyte** (III) and a membrane comprising a non-super-strong acid **polymer electrolyte** (IV). Preferred Process : A process for producing the laminated membrane comprises **coating** a solution containing an aromatic **polymer electrolyte** having super-strong acid groups on the membrane (II) and drying. Preferred Fuel Cell : In the fuel cell, a mixture of catalysts carried on carbon and **perfluoroalkylsulfonic** acid resins is fixed on an **electrode** material.

ABEX WIDER DISCLOSURE - A fuel cell contains the invented laminated membrane.
EXAMPLE - An aromatic **polymer** having super-strong acid groups (c) was obtained by reacting **poly**(oxy-4,4'-biphenyloxy-4,4'-**diphenylsulfone**), CH2Cl2 and bromosquicineimde while adding dropwise conc H2SO4, reacting the resulting **polymer** with 5-I-**octafluoropentyl-3-oxanpentasulfonyl fluoride** and reacting the resulting **polymer** K-salts with Cu powder. A composite membrane (e) was obtained by **coating** a **sulfonated** aromatic **polymer** having super-strong acid groups on a **polyethylene porous** film. A CH2Cl2/CH3OH solution containing the aromatic **polymer** (c) was **coated** on both **surfaces** of (e) placed on a glass plate, and dried at 60 degreesC for 10 minutes so as to obtain a laminate membrane (f). A fuel cell containing this membrane (f) generated a voltage of 0.58 V at an electric current of 0.50 (A/cm2).

L131 ANSWER 10 OF 20 WPIX COPYRIGHT 2007 THE THOMSON CORP on STN
AN 2003-457340 [43] WPIX
DNC C2003-121719 [43]
DNN N2003-363715 [43]
TI **Polymer electrolyte** solution for **electrode** assemblies in fuel cells, has **perfluorocarbon sulfonic** acid resin dissolved in solvent containing polar solvent which is hydrophilic and has boiling point
DC A85; L03; X16
IN FUJII Y; OHYA S; OYA N; TAKAGI; TAKAGI J
PA (FUJI-I) FUJII Y; (OHYA-I) OHYA S; (TAKA-I) TAKAGI J; (UBEI-C) UBE IND LTD
CYC 27
PIA WO 2003036655 A1 20030501 (200343)* JA 35[7] <--
JP 2004164854 A 20040610 (200438) JA 16
EP 1447816 A1 20040818 (200454) EN
US 20040265676 A1 20041230 (200503) EN
ADT WO 2003036655 A1 **WO 2002-JP11004 20021023**; US 20040265676 A1 **WO 2002-JP11004 20021022**; EP 1447816 A1 **EP 2002-802058 20021023**; JP 2004164854 A **JP 2002-307821 20021023**; EP 1447816 A1 **WO 2002-JP11004 20021023**; US 20040265676 A1 US 2004-493204 20040421
FDT EP 1447816 A1 Based on WO 2003036655 A
PRAI **JP 2002-278321 20020925**
JP 2001-328131 20011025
JP 2002-53552 20020228
AB WO 2003036655 A1 UPAB: 20050903
NOVELTY - **Polymer electrolyte** solution has a **perfluorocarbon sulfonic** acid resin dissolved in a solvent containing a polar solvent which is hydrophilic and has a boiling point.

DETAILED DESCRIPTION - INDEPENDENT CLAIMS are also included for the following:

(1) a **polymer electrolyte** film produced using the solution;

(2) a gas diffusion **electrode** for a **polymer electrolyte** solution fuel cell where a structure in which metal particles are dispersed on a **porous** carbon **substrate** is **coated** with a **polymer electrolyte** film formed from the **electrolyte** solution;

(3) a **polymer electrolyte** film-gas diffusion **electrode** assembly; and

(4) a fuel cell using the assembly.

USE - The solution is used in the production of **electrolyte** films for gas diffusion **electrodes** for fuel cells.

ADVANTAGE - The **polymer electrolyte** film has a high solvent resistance and a high strength. The fuel cell has a high electrical production efficiency per unit **surface** area.

TECH

ORGANIC CHEMISTRY - Preferred Materials: The solvent is a mixed solvent containing the polar solvent and water in an amount of 2-50 wt.%. The polar solvent is an aprotic solvent such as N,N-dimethyl-formamide,or an ether solvent. The weight ratio of polar solvent to water is 40/1-1/2.

POLYMERS - Preferred Composition: The concentration of **perfluorocarbon sulfonic** acid resin is 0.5-30 wt.%.

ABEX EXAMPLE - A **perfluorocarbon sulfonic** acid resin solution is precipitated in solid form by vaporizing the solvent, drying the **polymer** for 24 hours at low pressure and collecting the dark red **Nafion** (RTM) powder formed. This powder is dissolved in N,N-dimethyl-formamide to give a **polymer electrolyte** solution of concentration of 5-20 wt.%.

L131 ANSWER 11 OF 20 WPIX COPYRIGHT 2007 THE THOMSON CORP on STN

AN 2003-031681 [03] WPIX

DNC C2003-015469 [06]

DNN N2003-046451 [06]

TI Solid **polymer electrolyte** material used in solid **polymer** fuel cell, is made of **copolymer** comprising repeating unit based on **fluoromonomers**

DC A14; A85; L03; S03; X12; X16; X21; X25

IN ERIGUCHI T; KOKUKYO Y; KUNISA Y; TANUMA T; WATAKABE A

PA (ASAG-C) ASAHI GLASS CO LTD

CYC 29

PIA	EP 1220344	A2 20020703	(200303)*	EN	29[0]		<--
	CA 2366172	A1 20020626	(200303)	EN			<--
	JP 2002260705	A 20020913	(200303)	JA	19		<--
	US 20020142207	A1 20021003	(200303)	EN			<--
	US 7220508	B2 20070522	(200734)	EN			

ADT EP 1220344 A2 **EP 2001-130538 20011221**; CA 2366172 A1 **CA 2001-2366172 20011224**; JP 2002260705 A **JP 2001-394775 20011226**; US 20020142207 A1 **US 2001-25763 20011226**; US 7220508 B2 **US 2001-25763 20011226**

PRAI **JP 2000-395511 20001226**

AB EP 1220344 A2 UPAB: 20050706

NOVELTY - A solid **polymer electrolyte** material is made of a **copolymer** comprising repeating units based on **fluoromonomer** A and **fluoromonomer** B of specified formula. The **fluoromonomer** A on radical **polymerization** gives a **polymer** having an alicyclic structure in the main chain.

DETAILED DESCRIPTION - A solid **polymer electrolyte** material is made of a **copolymer** comprising repeating units based on **fluoromonomer** A which gives a **polymer** having an alicyclic structure in the main chain by radical **polymerization**, and **fluoromonomer** B of formula (B).

CF2=CF(Rf)jSO3M (B)

j = 0 or 1;
X = **fluorine**, chlorine or OM;
M = H, alkali metal or NR1R2R3R4;
R1-R4 = H or monovalent organic group;
Rf = 1-20C optionally branched **polyfluoroalkalylene**, which may contain ether oxygen atoms.

INDEPENDENT CLAIMS are also included for the following:

(i) A liquid composition comprising an organic solvent having a hydroxyl group, and the solid **polymer electrolyte** material;

(ii) A solid **polymer** fuel cell comprising an anode, cathode and a **polymer electrolyte** membrane disposed between anode and cathode. The cathode contains the solid **polymer electrolyte** material;

(iii) A **fluoropolymer** comprising a **copolymer** containing repeat unit of formula (I) and a repeat unit based on a **fluoromonomer** D of formula (II). The content of the repeat unit based on the **fluoromonomer** D is 10-75 mol.%, and the number average molecular weight is 5,000-5,000,000; and

(iv) A solid **polymer electrolyte** membrane made of a **polymer electrolyte** comprising a **copolymer** consisting of a repeat unit of formula (I), a repeat unit based on a **fluoromonomer** D of formula (II) and a repeat unit based on **tetrafluoroethylene**. The content of repeat unit of formula (I) and the content of repeat unit based on **tetrafluoroethylene** is 20-60 mol.%, respectively. The content of repeating unit based on **fluoromonomer** D is 10-40 mol.%.

CF2=CFO(CF2CFYO)k'(CF2)2SO3M (II)

Rf16, Rf17, Y = **fluorine** or **trifluoromethyl**; and

k1 = 0 or 1.

USE - As **polymer electrolyte** for lithium ion cell, as cation exchange resin, as sensor employing modified **electrode**, as ion exchange filter for removing trace amounts of ions in air or an actuator. The membrane formed using the **electrolyte** is used as cation permselective membrane for **electrolysis** of sodium chloride and water, production of hydrogen peroxide and ozone, for recovering waste acid, as cation exchange membrane for **electrolysis** in desalination or salt production, for diffusion dialysis in separation and purification of an acid, base and salt, as charged **porous** membrane for separation of protein and as dehumidifying and humidifying membranes. The solid **polymer** fuel cell is used as power source for vehicles such as electric car or for a small size cogeneration system.

ADVANTAGE - The solid **polymer** fuel cell has high power generation efficiency and high output density when the operation temperature is low. The utilization ratios of anode reaction gas and cathode reaction gas are high. The **fluoropolymer** has excellent ionic conductivity, water repellency and gas permeability hence the solid **polymer** material made using the **fluoropolymer** is excellent. A constant high electric output is obtained since the solid **polymer** fuel cell contains the **polymer electrolyte** material as a constituting material. Thus the solid **polymer** cell operable even at very high temperature. The solid **polymer electrolyte** material is durable, has improved cell life and does not shrink.

TECH

POLYMERS - Preferred Monomer: The **fluoromonomer** A is a **perfluoromonomer** and **fluoromonomer** B is same as **fluoromonomer** D.

Preferred Properties: The solid **polymer electrolyte** material has an ion exchange capacity of 0.5-2.5 meq/g dry resin. The -SO2X group at the terminal of the repeating unit based on the **fluoromonomer** B, is a -SO3H group, which is useful as a material constituting a solid **polymer** fuel cell. The **copolymer** of solid **polymer electrolyte** material has a softening temperature of 100degreesC.

ABEX DEFINITIONS - Preferred Definitions: - M = H.

SPECIFIC COMPOUNDS - The **fluoromonomer** A is selected from **perfluoro**(3-butenyl vinyl ether), **perfluoro** (2,2-dimethyl-1,3-dioxole), **perfluoro**(1,3-dioxole), 2,2,4-**trifluoro**-5-**trifluoromethoxy**-1,3-dioxole and **perfluoro**(2-methylene-4-methyl-1,3-dioxolane), preferably **perfluoro**(2,2-dimethyl-1,3-dioxole).

EXAMPLE - A nitrogen purged autoclave was charged with **perfluoro** (2,2-dimethyl-1,3-dioxazole) (PDD) (in g) (26.0), CF2=CFOCF2CF(CF3)OCF2CF2SO3H (127.8) (PSVE-H) and (CH3)2CHOC(=O)OOC(=O)OCH(CH3)2 (IPP) and **polymerized**. The obtained **polymer** was diluted, poured into hexane and precipitated. The **polymer** had average molecular weight of 56000. The obtained **polymer** was hydrolyzed, dissolved in ethanol and a transparent ethanol solution containing 10 mass% of the **polymer** PDD/PSVE-H was obtained. A platinum supported carbon (PSC) was dispersed in the obtained ethanol solution, dried and pulverized. The obtained powder was re-dispersed in 2,2,3,3,3-**pentafluoro**-1-propanol and a **coating** liquid for forming catalyst layer of cathode was obtained. PSC was mixed and dispersed in ethanol solution of **tetrafluoroethylene** (TFE)/PSVE-H **copolymer** obtained using TFE and PSVE-H, and a **coating** liquid was obtained for forming catalyst layer on anode. A water repellent carbon powder layer was loaded on water repellent carbon cloth, hot pressed and a catalyst layer was formed. The **coating** liquids for forming catalyst layers of cathode and anode were **coated** on water repellent carbon powder layer and dried to form respective **electrode** catalyst layers. The cathode and anode were cut and interposed with a **polymer electrolyte** membrane made of **sulfonic** acid type **perfluorocarbon polymer FLEMION** HR, bonded and a membrane **electrode** assembly was obtained. A separator made of carbon and having a gas flow path was mounted to obtain a cell for measurement. A current voltage characteristics test of the cell was carried out. Cell voltages upon expiration of 10 hours from the initiation of the operation at 0.3 A.cm-2 and 1 A.cm-2 were 820/mV and 725/mV respectively.

AN 2002-292013 [33] WPIX
DNC C2002-085768 [33]
DNN N2002-227994 [33]
TI Multicomponent composite film for **polymer electrolyte** consists of support layer film and **porous** gellable **polymer** layer which are united with each other without interface between them
DC A85; L03; P42; P73; X16
IN AHN B; AHN B I; AHN B I L C; AHN S; AHN S H; AN B; CHO C; CHO J; CHO J Y; GYONG Y; KYUNG Y; KYUNG Y J; LEE H; LEE H G; LEE H K; LEE H M; LEE H M L C; LEE S; LEE S J; LEE S J L C; LEE S Y; LEE S Y L C; PARK C; PARK S; PARK S Y; PARK S Y L C; RYONG H; SONG H; SONG H S; SONG H S L C; YONG H; YONG H H; BYEONG I A; HEON S S; HYANG-MOK L; HYEON H Y; HYEONG G L; YU J K
PA (AHNB-I) AHN B; (AHNS-I) AHN S; (CHOJ-I) CHO J; (KYUN-I) KYUNG Y; (LEEH-I) LEE H; (LEES-I) LEE S; (GLDS-C) LG CHEM CO LTD; (GLDS-C) LG CHEM LTD;

(PARK-I) PARK S; (SONG-I) SONG H; (YONG-I) YONG H
CYC 24
PIA WO 2002015299 A1 20020221 (200233)* EN 34[2] <--
KR 2002013634 A 20020221 (200257) KO <--
US 20020187401 A1 20021212 (200301) EN <--
KR 2002071203 A 20020912 (200311) KO <--
CN 1388993 A 20030101 (200328) ZH <--
EP 1310005 A1 20030514 (200333) EN <--
KR 373204 B 20030225 (200345) KO <--
JP 2004506542 W 20040304 (200417) JA 55
KR 406689 B 20031121 (200423) KO
CN 1258234 C 20060531 (200661) ZH
JP 2006289985 A 20061026 (200670) JA 17
JP 3885100 B2 20070221 (200716) JA 18
ADT WO 2002015299 A1 **WO 2001-KR1374 20010811**; KR 2002013634 A **KR 2000-46735 20000812**; KR 373204 B **KR 2000-46735 20000812** ; KR 2002071203 A **KR 2001-11191 20010305**; KR 406689 B **KR 2001-11191 20010305**; CN 1388993 A **CN 2001-802389 20010811**; CN 1258234 C **CN 2001-802389 20010811**; EP 1310005 A1 **EP 2001-958588 20010811**; US 20020187401 A1 **WO 2001-KR1374 20010811**; EP 1310005 A1 **WO 2001-KR1374 20010811**; JP 2004506542 W **WO 2001-KR1374 20010811**; JP 2004506542 W **JP 2002-520328 20010811**; JP 2006289985 A Div Ex **JP 2002-520328 20010811**; US 20020187401 A1 **US 2002-110047 20020405**; JP 2006289985 A JP 2006-135816 20060515; JP 3885100 B2 **WO 2001-KR1374 20010811**; JP 3885100 B2 **JP 2002-520328 20010811**
FDT KR 373204 B Previous Publ KR 2002013634 A; KR 406689 B Previous Publ KR 2002071203 A; EP 1310005 A1 Based on WO 2002015299 A; JP 2004506542 W Based on WO 2002015299 A; JP 3885100 B2 Previous Publ JP 2004506542 W; JP 3885100 B2 Based on WO 2002015299 A
PRAI **KR 2001-11191 20010305**
KR 2000-46735 20000812
AB WO 2002015299 A1 UPAB: 20060119

NOVELTY - The composite film consists of a **polymeric** support layer film (11) whose one or more sides is provided with a **porous** gellable **polymer** layer (12). The support layer film and the **porous** gellable **polymer** layer are united with each other without an interface (13) between them.

DETAILED DESCRIPTION - INDEPENDENT CLAIMS are also included for the following:

(i) preparation of the multicomponent composite film by preparing a **polymeric** support layer film, dissolving a gellable **polymer** in a solvent for preparing a gellable **polymer** solution and forming a gellable **polymer** layer on one or more sides of the support layer film, forming the **polymer** layer by **coating** the support layer film with the **polymer** solution and forming multiple layers, stretching the multiple layers and subjecting to heat setting;

(ii) **polymer** separator;

(iii) **polymer electrolyte** system consisting of a **porous** support layer film, a multi component composite separator, a salt represented by A+B- and an organic solvent (A+ is at least one selected from the group consisting of alkali metallic cations including Li+, Na+, K and their derivative, and B- is at least one selected from the group consisting of PF6-, BF4-, Cl-, AsF6-, CH3CO2-, CF3SO3-, N(CH3SO2)2- and C(CH3SO2)3-); and

(iv) **electrochemical** device comprising the **polymer electrolyte** system.

USE - Used for **polymer electrolyte** for

electrochemical devices, separators such as ultrafiltration membrane, gas separation membrane, pervaporation membrane, reverse osmosis membrane and separator for **electrochemical** device.

ADVANTAGE - The composite film has excellent **electrochemical** stability, adhesion to **electrode**, good wet-out rate of **electrolyte**, good ionic conductivity and mechanical properties. The composite film is prepared without extraction or removal process of plasticizer.

DESCRIPTION OF DRAWINGS - The figure shows a cross-section of the multicomponent composite film structure.

Support layer film (11)

Polymer layer (12)

Interface (13)

TECH

POLYMERS - Preferred Support Layer: The support layer film consists of high-density **polyethylene**, low-density **polyethylene**, linear low-density **polyethylene**, **polypropylene**, high-crystalline **polypropylene**, **polyethylene**-propylene **copolymer**, **polyethylene** -butylene **copolymer**, **polyethylene**-hexene **copolymer**, **polyethylene**-octene **copolymer**, **polystyrene**-butylene-styrene **copolymer**, **polystyrene**-ethylene-butylene-styrene **copolymer**, **polystyrene**, **polyphenylene** oxide, **polysulfone**, **polycarbonate**, **polyester**, **polyamide**, **polyurethane**, **polyacrylate**, **polyvinylidene**, chloride, **polyvinylidene fluoride**, **polysiloxane**, **polyolefin ionomer**, **polymethyl** pentene, hydrogenated oligocyclopentadiene (HOCP) and/or their **copolymers** or derivatives. The high crystalline **polypropylene** has at least one property selected from the group consisting of a density equal to or greater than 0.905 g/cc, a melting point equal to or greater than 164 degreesC, a crystallization temperature equal to or greater than 125 degreesC, crystallinity equal to or greater than 50%, isotacticity (or a pentad ratio) equal or greater than 96% and atactic ratio less than 5%. The support layer film is a blended film or a laminated film. The **pore** size of the support layer film is 0.001-10 microns and its thickness is 1-50 microns. The **pore** size of the **polymer** layer is 10 microns or less and its thickness is 0.01-25 microns.

Preferred **Polymer** Layer: The **polymer** layer consists of **polyvinylidene fluoride**, **polyvinylidene fluoride-chlorofluoroethylene copolymer**, **polyvinylidene fluoride-hexafluoropropylene copolymer**, **polyethylene** oxide, **polypropylene** oxide, **polybutylene** oxide,**polyurethane** **polyacrylonitrile**, **polyacrylate**, **polymethyl** methacrylate, **polyacrylic** acid, **polyamide**, **polyacrylamide**, **polyvinyl** acetate, **polyvinylpyrrolidone**, **polytetraethylene** glycol diacrylate, **polysulfone**, **polyphenylene** oxide, **polycarbonate**, **polyester**, **polyvinylidene** chloride **polysiloxane**, **polyolefin ionomer** and/or their **copolymer** or derivatives. The gellable **polymer** layers comprises at least one lithium salt selected from the group consisting of LiSCN, LiClO4, LiCF3SO3, LiAsF6, LiN(CF3SO2)2, and LiBF4 or comprises at least one **porous** inorganic particle selected from the group consisting of SiO2, TiO2, Al2O3, MgO and B2O3.

Preferred Process: The **polymer** layer is formed by **coating** the gellable **polymer** solution on one or both

sides of the support layer film, drying the **coated** support layer film and **coating** a release film with the **polymer** solution to form a **polymer** layer. The **coated** film is dried. Desorption of gellable **polymer** from the release film is performed and the desorbed film is heat-melted. The **coating** process is performed by dip **coating**, spray **coating**, dye **coating** or roll **coating**. The drying process is performed at a relative humidity of 1-100% under an atmosphere containing nitrogen, oxygen, carbon dioxide and/or air. High-temperature stretching is performed after the low-temperature stretching of the multiple layer. The low-temperature stretching is performed at 0-50 degreesC along one direction in a roll or a stretching machine. The high temperature stretching is uniaxially or biaxially performed in a roll or stretching machine at 50 degreesC to the melting point of the gellable **polymer** layer. The heat setting is performed at 50 degreesC to the melting point of **polymer** layer, for 5 seconds to 1 hour. The support layer film is prepared by injecting the **polymer** to an extruder equipped with a T-die or a tubular die in order to extrude the **polymer** and annealing it in a dry oven at room temperature to a **polymer** melting point of the support layer or is prepared by irradiating ion beams under a reactive gas atmosphere on either or both sides of the support layer film. The concentration of the gellable **polymer** solution is 0.1-90 wt.%

INORGANIC CHEMISTRY - Preferred Ion Irradiation: The ion beam irradiation is performed at a low rate of 105-1020 ions/cm2 by injecting reactive gases such as helium, hydrogen, oxygen, nitrogen, carbon dioxide, ammonia, carbon monoxide, methane and/or **chlorofluoro** carbon at a flow rate of 0.5-20 ml/min in a vacuum chamber at 10-1 to 106 torr. One or more particles of **electrons**, hydrogen, helium, oxygen, nitrogen, carbon dioxide, air, **fluoride**, neon, argon, krypton and nitrogen oxide are activated such that the particle has an energy of 10-2 to 106 keV, to form an ion beam.

ORGANIC CHEMISTRY - Preferred Solvent: The solvent is 1-methyl-2-pyrrolidone (NMP), acetone, ethanol, n-propanol, n-butanol, n-hexane, cyclohexanol, acetic acid, ethyl acetate, diethyl ether, dimethyl formamide (DMF), dimethylacetamide (DMAc), dioxane, tetrahydrofuran (THF), dimethyl **sulfoxide** (DMSO), cyclohexane, benzene, toluene, xylene, water and/or their derivatives.

Preferred **Electrolyte** System: The air permeability of the separator is 100-20,000 seconds/100cc. The organic solvent is propylene carbonate (PC), ethylene carbonate (EC), diethyl carbonate (DEC), dimethyl carbonate (DMC), dipropyl carbonate (DPC), dimethyl **sulfoxide**, acetonitrile, dimethoxyethane, diethoxy ethane, tetra- hydrofuran, N-methyl-2-pyrrolidone (NMP) and/or ethyl methyl carbonate (EMC).

MECHANICAL ENGINEERING - Preferred Device: The **electrochemical** device contains a super capacitor, an ultra capacitor, a secondary battery, a primary battery, a fuel battery, a sensor, an **electrolyzer** or an **electrochemical** reactor, which comprises the **polymer electrolyte** system.

ABEX EXAMPLE - A high crystalline **polypropylene** was used as a support layer film, and a **polyvinylidene fluoride** -chloro-tri-**fluoroethylene copolymer** was used as a gellable **polymer** layer. A high crystalline **polypropylene** was used for a material of a precursor film. It had a melt index of 2.0 g/10 minutes, a density of 0.91 g/cc, a melting point of 166.5 degreesC which was measured with DSC, a crystallization temperature of 116.5 degreesC, a crystallinity of 57%, an isotacticity of 98% which was measured with C13 nuclear magnetic resonance (NMR), and an atactic fraction of about 2% which was measured after being dissolved in xylene. The precursor film was prepared from the high crystalline

polypropylene with use of a single screw extruder. The extrusion temperature and cooling-roll temperature were respectively 220 degreesC and 80 degreesC. The take-up speed was 20 m/minute, and the draw down rate (DDR) was 60. The precursor film was annealed in a dry oven at 150 degreesC for an hour. After annealing, the solution that was dissolved in acetone was dip **coated** on both sides of the prepared precursor film. The **coating** was performed under air while maintaining 60% relative humidity, and the acetone was vaporized at the same condition of 60% relative humidity. The **coated** precursor film was mono-axially low-temperature-stretched to 50% of the stretching ratio based on the initial length of the film at room temperature, and it was further mono-axially low-temperature-stretched to 100% of the stretching ratio based on the initial length of the film at room temperature. After low-temperature-stretching, the low-temperature-stretched precursor film was heat-set at 140 degreesC under tension for 10 minutes, and it was cooled in order to prepare a multi-component composite film. Air permeability, interfacial adhesion strength and wet-out rate of **electrolyte** were evaluated and found to be 520 seconds/100cc, 160 gf and 9 seconds, respectively.

L131 ANSWER 13 OF 20 WPIX COPYRIGHT 2007 THE THOMSON CORP on STN
AN 2001-607384 [69] WPIX
CR 2001-529860; 2001-616142
DNC C2001-180470 [69]
DNN N2001-453408 [69]
TI Formation of gas diffusion **electrode**, for **polymer electrolyte** membrane fuel cells, by treating **electrode** formed from mixture of **polymer electrolyte**, **electrocatalyst** and nanosized **pore**-former, to remove **pore**-former
DC A14; A85; L03; X16
IN APPLEBY A J; GAMBURZEV S
PA (TEXA-C) UNIV TEXAS A & M SYSTEM
CYC 92
PIA WO 2001065617 A2 20010907 (200169)* EN 70[26] <--
AU 2001068024 A 20010912 (200204) EN <--
US 20010031389 A1 20011018 (200211) EN 44 <--
US 6649299 B2 20031118 (200376) EN
AU 2001268024 A8 20051020 (200615) EN
ADT WO 2001065617 A2 **WO 2001-US4486 20010209**; US 20010031389 A1 Provisional **US 2000-181893P 20000211**; US 20010031389 A1 Provisional **US 2000-181894P 20000211**; US 20010031389 A1 Provisional **US 2000-182010P 20000211**; US 6649299 B2 Provisional **US 2000-181893P 20000211**; US 6649299 B2 Provisional **US 2000-181894P 20000211**; US 6649299 B2 Provisional **US 2000-182010P 20000211**; US 20010031389 A1 **US 2001-779868 20010208**; US 6649299 B2 **US 2001-779868 20010208**; AU 2001068024 A **AU 2001-68024 20010209**; AU 2001268024 A8 **AU 2001-268024 20010209**
FDT AU 2001068024 A Based on WO 2001065617 A; AU 2001268024 A8 Based on WO 2001065617 A
PRAI **US 2001-779868 20010208**
US 2000-182010P 20000211
US 2000-181894P 20000211
US 2000-181893P 20000211
AB WO 2001065617 A2 UPAB: 20050902
NOVELTY - An **electrode** is formed on a **substrate** by **applying** a mixture comprising **polymer electrolyte**, **electrocatalyst** and nanosized **pore**-former to the **substrate**. The obtained **electrode** is then treated to remove the nanosized **pore**-former, to obtain gas

diffusion **electrode**.

DETAILED DESCRIPTION - INDEPENDENT CLAIMS are also included for;

(1) Formation of membrane **electrode** assembly involves forming an **electrode** on the **substrate**, attaching **electrode** to a membrane to form membrane **electrode** assembly and treating the **electrode** to remove **pore** -former;

(2) Formation of gas permeable layer for use in fuel cells involves **applying** nanosized **pore**-former to a composition and treating the composition to remove nanosized **pore**-former;

(3) **Electrode** comprising **polymer electrolyte**, **electrocatalyst** and nanosized **pores** ;

(4) Fuel cell comprising an **electrode**; and

(5) Fuel cell stack comprising a layer having nanosized **pores**.

USE - For **polymer electrolyte** membrane fuel cells (claimed) used for power generation.

ADVANTAGE - The gas diffusion **electrode** with high performance is provided. The fuel cell stack that provides electrical power in a lighter package, is provided using the gas diffusion **electrode**.

TECH

INORGANIC CHEMISTRY - Preferred Composition: The mixture contains 20-60 weight% (wt.%) (preferably, 35-45 wt.%) of nanosized **pore**-former such as fumed silica.

Preferred Process: The **electrode** is treated chemically by contacting it with an alkali metal hydroxide solution, to remove the **pore**-former. The activation of **polymer electrolyte** present in the **electrode** is carried out by contacting the **electrode** with an acidic solution. The mixture comprising **polymer electrolyte**, **electrocatalyst** and nanosized **pore**-former is **applied** to the **substrates** by rolling, calendering, pressing, printing, spraying, brushing, **electrostatic** spraying, dry filtering or wet filtering.

Preferred **Substrate**: The **substrate** is carbon cloth, carbon paper, **porous** carbon or **porous** metal (which comprises a three-dimensional reticulated metal structure). The **porous** metal is copper, nickel, aluminum, titanium or aluminum-titanium alloy.

Preferred Membrane: The membrane is **polymer electrolyte** membrane or **fluorinated sulfonic** acid membrane.

Preferred Layer: The gas permeable layer is an intermediate layer or hydrophilic layer comprising **perfluorosulfonic** acid **polymer** and carbon black.

ABEX EXAMPLE - **Electrode** with a support layer loaded with 10 mg/cm2 carbon (acetylene black) and catalyst layer with 4 mg/cm2 platinum as 60 weight% (wt.%) platinum on carbon, with 6 wt.% of **polytetrafluoroethylene**, was prepared using dry method. The prepared **electrode** was tested in small 5 cm2 cell with a membrane **electrode** assembly using **Nafion** 112 (RTM) **electrolyte** and 3.9 mg/cm2 platinum **electrodes**. The steady-state cell potential over 100 hours was 0.68 V at current density of 0.7 A/cm2. The effect of changing the platinum loading of the supported catalyst was then investigated using GORE-SELECT (RTM) membrane of 20 micron thickness. Cathode with total platinum loading of 1.4 mg/cm2 but with differing wt.% platinum on carbon Vulcan XC-72R (RTM) was prepared and tested in 5 cm2 test cells. The anode platinum loading was maintained at 0.3 mg/cm2. A graph of cell potential versus current density was

plotted, and the result showed that a membrane **electrode** assembly with 60 wt.% platinum on carbon **electrocatalyst** showed 50 mV higher potential at constant current density than a membrane **electrode** assembly with 40 wt.% platinum on carbon **electrocatalyst**. The improvement mainly results from higher platinum utilization in the 60 wt.% platinum on carbon **electrocatalyst**.

L131 ANSWER 14 OF 20 WPIX
AN **1999-418882** [35] WPIX
DNC C1999-123128 [35]
DNN N1999-312681 [35]
TI Sealing **porous surface**, used in e.g. **electronic** parts
DC A14; A32; A82; G02; L03; M11; M13; P42
IN BIRCHENALL A K; BROTHERS P D; HRIVNAK J A; MERIGOLD R J; MORGAN R A
PA (DUPO-C) DU PONT DE NEMOURS & CO E I
CYC 20
PIA WO 9932234 A1 19990701 (199935)* EN 25[6] <--
EP 1042078 A1 20001011 (200052) EN <--
ADT WO 9932234 A1 **WO 1998-US26903 19981218**; EP 1042078 A1 **EP 1998-964057 19981218**; EP 1042078 A1 **WO 1998-US26903 19981218**
FDT EP 1042078 A1 Based on WO 9932234 A
PRAI **US 1997-68431P 19971222**
AB WO 1999032234 A1 UPAB: 20050521

NOVELTY - **Coating** a **substrate** comprises **applying** a **porous coating**, and then **applying** a **fluoropolymer** solution to seal the pores and provide a nonporous **coated substrate**.

DETAILED DESCRIPTION - INDEPENDENT CLAIMS are also included for the following:

(1) a **coated** article; and

(2) a **coating** process comprising **applying** to the **substrate** a **coating** that contains pores and comprises 5-30 weight% **polymeric** material, and then removing the **polymeric** material to form voids in the **coating**.

USE - Used for **coating** vessels and **electronic** parts (claimed). Also used for **coating** pipes, valves, bake ware, cookware, hot plates, saws, dies, tools and ship bottoms.

ADVANTAGE - The process seals the pores and crevices of thermally sprayed **coatings**, inhibiting corrosion and blistering, and extending the lifetime of process equipment by at least a factor of 8 to reduce downtime.

TECH

INORGANIC CHEMISTRY - Preferred Material: The **substrate** is carbon **steel**, **stainless steel**, aluminium or copper metal, selected from alumina or silica ceramic, or a composite of metal and a **porous surface** layer. The **fluoropolymer coating** seals the pores of the **porous surface** layer. The **porous coating** comprises metal, ceramic, **polymer** and/or composite.

POLYMERS - Preferred **Coating**: The **porous coating** on the **substrate** comprises **polymer**. The **polymeric** material contained in the **coating** having pores is a **fluoropolymer** which is soluble in **perfluorinated** solvents.

Preferred **Fluoropolymer**: The **fluoropolymer** solution comprises a **fluoropolymer** of molecular weight 200000-400000, and is preferably a **copolymer** of **tetrafluoroethylene** (TFE)

and **perfluoroethyl** vinyl ether (PEVE). The **fluoropolymer** includes **copolymers** of TFE with functional or nonfunctional comonomers such as 2-8 C **fluoroolefin** and **fluorinated** alkyl vinyl ether having a 1 C or 3-5 C alkyl. Nonfunctional monomers include **hexafluoropropylene** (HFP), **chlorotrifluoroethylene** (CTFE), PEVE, **perfluoromethyl** vinyl ether (PMVE) and **perfluoropropylene** vinyl ether (PPVE). Functional monomers include **perfluoro** vinyl ether (EVE), EVE-carbamate of formula (I), PSEPVE of formula (II), 8CNVE of formula (III), EVE-triazine of formula (IV), EVE-CN of formula (V), EVE-OH of formula (VI), EVE-P (VII) and/or EVE-COOH of formula (VIII).

CF2CFOCF2-CFCF3O-CF2CF2COOCH3 (I)
CF2CFOCF2CFCF3OCF2CF2SO2F (II)
CF2CFOCF2CFCF3OCF2CF2CN (III)
N3(CF2CFOCF2CFCF3OCF2CF2)3 (IV)
CF2CFOCF2CFCF3OCF2CF2CN (V)
CF2CFOCF2CFCF3OCF2CF2CH2OH (VI)
CF2CFOCF2CFCF3OCF2CF2CH2PO2(OH)2 (VII)
CF2CFOCF2CFCF3OCF2CF2CH2COOH (VIII)

METALLURGY - Preferred **Coating**: The first **porous coating** is **applied** to the **substrate** by thermal spray **deposition** or by **electroplating**. The porosity of a **porous** metal **coating** is decreased to less than 0.025% after **coating** with the **fluoropolymer** solution, in areas that are penetrated by the solution, and the corrosion resistance of the **coated substrate** is improved by a factor at least 8 time units. The **porous coating** may additionally contain **fluoropolymer**, and after the **fluoropolymer coating** has been **applied**, sintering is carried out to join the resulting **fluoropolymer** layer to the **fluoropolymer** in the **porous coating**.

In the second process, the **polymeric** material is removed from the **porous coating** by heating the **coated substrate** to 300 degrees C for 30 minutes. Alternatively, when the **polymeric** material is a **perfluorinated** solvent soluble **fluoropolymer**, the **fluoropolymer** is dissolved in the solvent, and the **fluoropolymer** solvent mix flows through the **coating** to fill the voids at a **coating-substrate** interface.

ABEX EXAMPLE - Ammonium perflurononanoate (5 g) was added into deaerated demineralised water (2200 ml) at atmospheric pressure. The mixture was agitated at 100 rpm and heated to 90 degrees C with the pressure increased to 400 psig by adding a mixture of 27.2 wt.% TFE, 51 wt.% PMVE and 21.8 wt.% PEVE. An initial charge of a 1.5 g/l solution of ammonium **persulphate** in water (30 ml) was added. At start of reaction shown by a 10 psi pressure drop, the same initiator solution was fed at 2 ml/minute and 600 g monomer mixture comprising 62 pts. wt. TFE, 23 pts. wt. PMVE and 15 pts. wt. PEVE, was fed to maintain pressure at 400 psig. When the pressure dropped to 250 psig, the product dispersion obtained had a solids content of 22.3 wt.%. - The recovered **copolymer** comprised 56.3 pts. wt. TFE, 29.9 pts. wt. PMVE and 18.8 pts. wt. PEVE, and had a weight average molecular weight (Mw) = 279000. Cleaned test panels comprising plates of carbon **steel coated** with Inconel Alloy 625 (RTM: corrosion resistant alloy) by a high velocity oxy-fuel technique, were sealed by dipping in a 3 wt.% solution of the obtained **polymer** in PF-5080 (RTM: **perfluorooctane**), drying at 150 degrees C, and repeating the dipping and drying. The sealed panels survived 24 weeks of exposure to 1% **sulphuric** acid and its vapour at 60 degrees C, while unsealed panels failed by blistering

after 3 weeks.

L131 ANSWER 15 OF 20 WPIX COPYRIGHT 2007 THE THOMSON CORP on STN
AN 1998-388430 [33] WPIX
DNC C1998-117632 [33]
DNN N1998-302837 [33]
TI Gas diffusion **electrode** comprises gas diffusion layer and **porous** ion-exchange resin-containing catalyst layer - with improved conductivity, output density and water retention, lowered membrane resistance, useful for solid **polymer electrolyte**-type fuel cells
DC A85; L03; X16
IN TOTSUKA K
PA (NIST-C) JAPAN STORAGE BATTERY CO LTD; (TOTS-I) TOTSUKA K; (YUAS-C) GS YUASA CORP KK
CYC 5

PIA	WO 9829916	A1	19980709	(199833)*	JA	30[8]	<--
	JP 10241701	A	19980911	(199847)	JA	12	<--
	EP 949703	A1	19991013	(199947)	EN		<--
	CN 1242111	A	20000119	(200023)	ZH		<--
	US 20020004159	A1	20020110	(200208)	EN		<--
	US 6592934	B2	20030715	(200348)	EN		<--
	CN 1230933	C	20051207	(200654)	ZH		
	JP 3903562	B2	20070411	(200726)	JA	15	

ADT WO 9829916 A1 **WO 1997-JP4911 19971226**; CN 1242111 A **CN 1997-181058 19971226**; CN 1230933 C **CN 1997-181058 19971226**; EP 949703 A1 **EP 1997-950441 19971226**; JP 10241701 A **JP 1997-370336 19971226**; EP 949703 A1 **WO 1997-JP4911 19971226**; US 20020004159 A1 **WO 1997-JP4911 19971226**; US 6592934 B2 **WO 1997-JP4911 19971226**; US 20020004159 A1 **US 1999-331850 19990628**; US 6592934 B2 **US 1999-331850 19990628**; JP 3903562 B2 **JP 1997-370336 19971226**
FDT EP 949703 A1 Based on WO 9829916 A; US 6592934 B2 Based on WO 9829916 A; JP 3903562 B2 Previous Publ JP 10241701 A
PRAI **JP 1996-357974 19961227**
AB WO 1998029916 A1 UPAB: 20060114
A gas diffusion **electrode** for solid **polymer electrolyte**-type fuel cells comprises a gas diffusion layer and catalyst layer which is composed of a catalyst and **porous** ion-exchange resin.Also claimed are the following: (i) processes for producing the **electrode** by **coating** the catalyst layer precursor made from some catalyst bodies with the ion-exchange resin, then soaking in a polar organic solvent other than alcoholic hydroxide, and allowing the resin to solidify and perforate; (ii) a joined body by fixing the **electrode** to at least 1 side of the solid **polymer electrolyte** membrane; and (iii) a solid **polymer electrolyte** membrane which is made from ion-exchange resin as the essential ingredient and with **pores**.

USE - The gas diffusion **electrode** is particularly useful for solid **polymer electrolyte**-type fuel cells (claimed).

ADVANTAGE - Said **electrode** has enhanced conductivity, output density and water retention, as well as lowered membrane resistance.

L131 ANSWER 16 OF 20 WPIX COPYRIGHT 2007 THE THOMSON CORP on STN
AN 1998-042471 [04] WPIX
DNN N1998-033953 [04]
TI Cylindrical proton exchange membrane fuel cell manufacture method - disposing cathode comprising proton exchange catalyst around and in ionic

communication with membrane outer **surface** of inner
polymer electrolyte membrane
DC X16
IN BASS E A; CAMPBELL J; MERRITT P M; SHARP C A; WALL C M
PA (SWRI-C) SOUTHWEST RES INST
CYC 70
PIA WO 9747052 A1 19971211 (199804)* EN 48[4] <--
AU 9733766 A 19980105 (199821) EN <--
US 6001500 A 19991214 (200005) EN <--
ADT WO 9747052 A1 **WO 1997-US9659 19970605**; US 6001500 A Provisional
US 1996-19182P 19960605; AU 9733766 A **AU 1997-33766**
19970605; US 6001500 A **US 1997-869795 19970605**
FDT AU 9733766 A Based on WO 9747052 A
PRAI **US 1996-19182P 19960605**
US 1997-869795 19970605
AB WO 1997047052 A1 UPAB: 20060113
A slowly rotating lathe (10) allows the controlled **application**
of low viscosity solutions while casting the **polymer**
electrolyte membrane on a graphite core. The preferably
porous, moulded or machined graphite cylinder **electrode**
(12) is supported in the lathe e.g. by glass rods (18). Rolled sheet
construction is also possible.
A solution is used to **deposit** catalyst particles onto the
electrode surface and, after drying, a solid
polymer electrolyte membrane layer is formed by
applying a stock **ionomer** solution (28). An outer
catalyst layer is formed and an outer **electrode** (30), preferably
carbon tow, is wound round the assembly.
ADVANTAGE - Provides method of manufacturing effective cylindrical
fuel cell for low temperature, fast transient response and high energy
density.

L131 ANSWER 17 OF 20 WPIX COPYRIGHT 2007 THE THOMSON CORP on STN
AN 1997-513313 [48] WPIX
DNC C1997-163869 [48]
DNN N1997-427260 [48]
TI Measuring specific **surface** area of catalyst available for
reaction in fuel cells - comprises reducing first and second
electrode materials to be compared, exposing them to carbon
mono:oxide and subtracting obtained values
DC A35; A85; J02; L03; S03; W06; X16; X21
IN EDA N; FUKUOKA H; FUKUOKA Y; SUGAWARA Y; UCHIDA M
PA (MATU-C) MATSUSHITA DENKI SANGYO KK; (MATU-C) MATSUSHITA ELECTRIC IND CO
LTD
CYC 4
PIA CA 2195281 A 19970717 (199748)* EN 26[4] <--
DE 19701174 A1 19971030 (199749) DE 10[4] <--
JP 09257687 A 19971003 (199750) JA 8[5] <--
US 5866423 A 19990202 (199912) EN <--
US 6242260 B1 20010605 (200133) EN <--
CA 2195281 C 20041026 (200471) EN
ADT CA 2195281 A **CA 1997-2195281 19970116**; JP 09257687 A **JP**
1996-294722 19961107; DE 19701174 A1 **DE 1997-19701174**
19970115; US 5866423 A **US 1997-783577 19970115**; US 6242260
B1 Div Ex **US 1997-783577 19970115**; US 6242260 B1 **US**
1998-181741 19981028
FDT US 6242260 B1 Div ex US 5866423 A
PRAI **JP 1996-294722 19961107**
JP 1996-4570 19960116
AB CA 2195281 A UPAB: 20060113

Measuring the specific **surface** area (SSA) available for reaction of a noble metal catalyst of an **electrode** material powder for a **polymer electrolyte** membrane fuel cell (PEMFC) comprises: (a) reducing a first **electrode** material powder comprising a noble metal catalyst on a powdered carbon carrier; (b) reducing a second **electrode** material powder comprising a noble metal catalyst covered with **polymer electrolyte** (PE) on a powdered carbon carrier; (c) exposing the first **electrode** powder to carbon monoxide and measuring the total SSA of the noble metal catalyst from the amount of carbon monoxide adsorbed; (d) exposing the second **electrode** powder to carbon monoxide and measuring the SSA of the catalyst from carbon monoxide adsorption as above; and (e) obtaining the available SSA by subtracting the value obtained in step (d) from the value obtained in step (c).
Also claimed is an **electrode** for a PEMFC having an **electrode** material comprising: (i) a noble metal catalyst powder; and (ii) a **polymer electrolyte**; such that the utilisation ratio of the catalyst is at least 40% of the saturation utilisation value.

USE - Used for determining the utilisation ratio of a noble metal catalyst in a **polymer electrolyte**. PEMFCs are used as the power supply aboard spacecraft and also for consumer uses, e.g. as the driving power source for electric vehicles and boats, and as portable power supplies.

ADVANTAGE - The SSA of catalyst available for reaction is measured accurately to allow control of the catalyst utilisation ratio. This control provides an **electrode** material with excellent polarisation characteristics.

L131 ANSWER 18 OF 20 WPIX COPYRIGHT 2007 THE THOMSON CORP on STN
AN 1997-308242 [28] WPIX
DNC C1997-099123 [28]
DNN N1997-255412 [28]
TI Solid **polymer electrolyte** type fuel battery - has per:**fluorocarbon:sulphonic** acid resin* impregnated into and **deposited** on **porous** base matter, giving composite **polymer** membrane, lowering **electrolyte** membrane resistance.
DC A85; L03; X16
IN HIRATA I; MORIGA T
PA (MITO-C) MITSUBISHI JUKOGYO KK
CYC 1
PIA JP 09120827 A 19970506 (199728)* JA 6[0] <--
ADT JP 09120827 A **JP 1995-275444 19951024**
PRAI **JP 1995-275444 19951024**
AB JP 09120827 A UPAB: 20050518

Perfluorocarbonsulphonic acid resin is impregnated into and **deposited** on the **porous** base matter to give the combined **polymer** membrane.

USE - Used as a solid **polymer electrode** membrane.

ADVANTAGE - The combined **polymer** membrane is used as a solid **polymer electrode** membrane of the fuel battery in which resistance of **electrolyte** membrane is lowered.

L131 ANSWER 19 OF 20 WPIX COPYRIGHT 2007 THE THOMSON CORP on STN
AN 1995-199628 [26] WPIX
DNC C1995-092257 [26]
DNN N1995-156833 [26]
TI Non-**porous perfluorinated** ion-exchange membrane mfr.

- comprises mixing **perfluorinated polymer** solution with
ionic **surfactant** and casting mixture to produce non-**porous**
perfluorinated film membrane
DC A91; E19; J01; X25
IN KOVAL C; NOBLE R D; PELLEGRINO J; RABAGO R
PA (COLS-C) UNIV COLORADO FOUND INC
CYC 1
PIA US 5417832 A 19950523 (199526)* EN 10[2] <--
ADT US 5417832 A **US 1992-935016 19920825**
PRAI **US 1992-935016 19920825**
AB US 5417832 A UPAB: 20050702
Production of a non-**porous** **perfluorinated** ion-exchange
membrane comprises: (a) mixing a **perfluorinated polymer**
solution with an ionic **surfactant** solution such that the ionic
surfactant comprises 1-60 mol.% total solids (in the cast
membrane); and (b) casting the above mixture to produce a non-**porous**
perfluorinated film membrane in which the **surfactant** is
incorporated into the microstructure of the membrane.
Also claimed is a membrane prepared by the above process and having improved
transport characteristics.
Also claimed is a process for increasing the ion-exchange site density of
perfluorinated ion-exchange membranes.
USE - The membranes can be used to separate NH3, CO2, and H2S from
gaseous and liquid mixts., in the production of NaOH and Cl2 gas from the
electrolysis of NaCl, to dehydrate medical and industrial gases,
to separate water from organic solvents including azeotropes, to separate
isomers, to separate toxic and radioactive metals from aqueous streams, etc..
They may also be used as protective **coatings** on garments, as
ion-specific **coatings** on **electrochemical** sensors and
in solid **polymer electrolyte** H2/O2 fuel cells.
ADVANTAGE - Membranes containing the **surfactant** have improved
microstructural crystallinity, decreased equivalent weights., improved
ion-exchange site density (claimed) and improved transport properties
(claimed).

L131 ANSWER 20 OF 20 WPIX COPYRIGHT 2007 THE THOMSON CORP on STN
AN 1993-295215 [37] WPIX
CR 1994-182603
DNC C1993-130957 [37]
DNN N1993-227477 [37]
TI Fuel cell having solid per:**fluoro copolymer**
electrolyte membrane - enabling efficient **electrolyte**
generation at near ambient temps. and pressures without humidification
DC A14; A85; L03; X16
IN DHAR H P
PA (BCST-N) BCS TECHNOLOGY INC
CYC 1
PIA US 5242764 A 19930907 (199337)* EN 9[4] <--
ADT US 5242764 A **US 1991-809581 19911217**
PRAI **US 1991-809581 19911217**
AB US 5242764 A UPAB: 20050823
Fuel cell (5) generating electricity from reaction between fuel and
oxidant sources (10,12) comprises a pair of **porous** gas diffusion
electrodes (18,20) defining an electric field, first and second
electrolytes (22,24) **deposited** on respective
electrodes, and an **electrolyte** membrane (30) with a
central hole (32) positioned between and in contact with both
electrolyte deposits.
Both **electrolyte deposits** and the **electrolyte**
membrane are perflurocarbon **copolymer**, portion conducting

material, the **electrolyte deposits** most pref.
comprising 10 - 20 mg per 5 cm2 area of a 5 percent solution of **Nafion** (RTM for Dupont **perfluorocarbon**).
The **electrodes** are a fuel **electrode** and an oxidant **electrode**, each having a distribution member (14,16) in flow communication for supplying gaseous fuel and oxidant respectively and an **electrolyte** member between and in contact with both of them comprising an **electrolyte** membrane sheet having a central hole and **electrolyte deposited** on opposite **surfaces**
.

USE/ADVANTAGE - Fuel cell employs a solid **polymer electrolyte** membrane which does not need humidification of itself or the reactant gases to operate efficiently. Consequently, it is less complex in structure and can have much thinner **electrolyte** layers and, therefore, much reduced ohmic resistance enabling it to operate at near ambient temps. and pressures. - .Drf

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=> d his

     (FILE 'HOME' ENTERED AT 14:36:52 ON 01 NOV 2007)
                SET COST OFF

     FILE 'HCAPLUS' ENTERED AT 14:37:01 ON 01 NOV 2007
L1            1 S US20050014050/PN OR US2003-620675#/AP,PRN
                E PUNSALAN/AU
L2           21 S E4,E5
                E MARDILOVICH/AU
L3          137 S E14-E19
L4           53 S E9-E13
                E HERMAN/AU
L5           15 S E3
                E HERMAN G/AU
L6           95 S E3,E11
                E HERMAN GREG/AU
L7           85 S E5-E8
                E HEWLET/CO
L8         5295 S E4,E6-E143
                E E22+ALL
L9         5614 S E2+RT OR E2-E57/PA,CS
                E HEWLET/PA,CS
L10           1 S E5-E8
L11        2320 S E15-E180
L12        2392 S E181-E276
L13        1091 S E277-E336
L14         244 S E337-E408
L15         531 S E409-E480
L16         353 S E481-E552
L17          86 S E553-E595,E599-E603
L18        5399 S (HEWLET?(L)PACKAR?)/PA,CS,CO
L19       11188 S NAFION
L20         286 S FLEMION
L21           7 S DOW XUS
L22           0 S DOW X US
                E FLUOROPOLYMER/CT
                E E4+ALL
L23        5363 S E2
L24        5412 S FLUOROPOLYMER?/CW,CT (L) IONOMER?
L25        6567 S FLUOROPOLYMER?/CW,CT (L) (SULFO? OR SULPHO?)
                E FLUOROPOLYMERS/CT
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                E E3+ALL
                E E4
                E FLUOROPOLYMERS,/CT
L26        3459 S (E13 OR E14)(L)IONOMER?
L27        4075 S (E13 OR E14)(L)(SULFO? OR SULPHO?)

     FILE 'REGISTRY' ENTERED AT 14:47:18 ON 01 NOV 2007
                E NAFION
L28         257 S E3
                E NAFION/ENTE
L29          10 S E3
                E FLEMION
L30          55 S E3
                E FLEMION/ENTE
L31           3 S E3
                E DOW XUS/CN
                E DOW-XUS/CN
L32           0 S DOW(L)XUS
                E XUS
L33           1 S 137398-84-6
                E XUS
L34         102 S E3
                E XUS/ENTE
L35           5 S E3

     FILE 'HCAPLUS' ENTERED AT 14:50:50 ON 01 NOV 2007
L36      265718 S L28-L35
L37      274259 S L19,L20,L21,L23-L27,L36
                E ELECTRODEPOSIT/CT
L38       57240 S E5-E32,E36
L39       15831 S E37-E71
                E E5+ALL
L40       65713 S E10+OLD,NT
                E E32+ALL
L41       15940 S E3+OLD
                E E11+ALL
                E E31+ALL
L42       17436 S E2+OLD
L43        1716 S L37 AND L38-L42
L44         844 S L37 AND C25D/IPC,IC,ICM,ICS
L45        1615 S L37 AND (?ELECTRODEPOS? OR ?ELECTROPLAT? OR ?ELECTROCOAT?)
L46        1815 S L37 AND (?ELECTROPHOR? OR ?ELECTROLY?)(S)(DEPOS? OR COAT? OR
L47        4306 S L43-L46
L48         556 S L47 AND IONOMER?
L49        4306 S L47,L48
                E POLYMER ELECTROLYTE/CT
                E E5+ALL
L50        4677 S E9
                E E8+ALL
L51        5537 S E5,E6
                E E7+ALL
                E E13+ALL
L52       18727 S E5+OLD
                E ELECTROLYTES/CT
                E E3+ALL
                E E10+ALL
L53        9659 S E5
                E E4+ALL
                E E12+ALL
L54        5519 S E11+OLD
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               E E14+ALL
L55      21880 S E8
               E ELECTROLYTES/CT
               E E3+ALL
               E E15+ALL
L56       1711 S E13
L57        592 S L49 AND L50-L56
L58        920 S L49 AND ?POLYM?(L)?ELECTROLYTE?
L59       1120 S L57,L58
L60        245 S L59 AND PY<=2003 NOT P/DT
L61        485 S L59 AND (PD<=20030715 OR PRD<=20030715 OR AD<=20030715) AND P
L62        730 S L60,L61
L63          3 S L1-L18 AND L62
L64          5 S L1-L18 AND L49
L65          2 S L64 NOT L63
L66          1 S L65 NOT 9/SC
L67          4 S L63,L66

     FILE 'REGISTRY' ENTERED AT 15:02:57 ON 01 NOV 2007
               E STAINLESSS STEEL/CN
               E STAINLESS STEEL/CN
L68          1 S E3
L69        108 S STAINLESS STEEL
L70        108 S STAINLESS(L)STEEL

     FILE 'HCAPLUS' ENTERED AT 15:03:43 ON 01 NOV 2007
L71        153 S L49 AND L68-L70
L72        164 S L49 AND STAINLESS(L)STEEL
L73        197 S L71,L72
L74         31 S L73 AND PY<=2003 NOT P/DT
L75        113 S L73 AND (PD<=20030715 OR PRD<=20030715 OR AD<=20030715) AND P
L76        144 S L74,L75
L77         24 S L76 AND L62
L78          2 S L77 AND (?POROUS? OR ?POROS? OR PORE?)
L79         22 S L77 NOT L67,L78
               SEL AN 9-13 15-18 20
L80         10 S L79 AND E1-E20
L81         22 S L76 AND (?POROUS? OR ?POROS? OR PORE?)
L82         20 S L81 NOT L78
               SEL AN 1 2 3 5 11
L83          5 S L82 AND E21-E30
L84        100 S L76 NOT L78-L83
L85         53 S L73 NOT L76-L84
               SEL AN 4 40
L86          2 S L85 AND E31-E34
L87         23 S L67,L78,L80,L83,L86
L88         23 S L87 AND L1-L27,L36-L67,L71-L87
L89         23 S L88 AND (?DEPOS? OR ?PLAT? OR ?COAT? OR SUBSTRATE OR SURFAC?
L90          8 S L89 AND ?CONDUCT?
L91         12 S L89 AND POLY?/CW,CT
L92         18 S L89-L91 AND (H01M/IPC,IC,ICM,ICS OR FUEL CELL OR ELECTR? CELL
L93         23 S L89-L92

     FILE 'HCAPLUS' ENTERED AT 15:42:22 ON 01 NOV 2007

     FILE 'WPIX' ENTERED AT 15:43:11 ON 01 NOV 2007
L94      54561 S C25D/IPC,IC,ICM,ICS
L95       4579 S X25-R04/MC
L96       3613 S N7056/PLE
L97       1158 S N7125/PLE
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L98        34161 S ?ELECTRODEPOS? OR ?ELECTROPLAT? OR ?ELECTROCOAT?
L99        30787 S (?ELECTROPHOR? OR ?ELECTROLY?)(S)(DEPOS? OR COAT? OR PAINT?)
L100       94712 S L94-L99
L101       85785 S L100 AND (PD<=20030715 OR PRD<=20030715 OR AD<=20030715)
L102         133 S L101 AND (NAFION OR FLEMION# OR DOW (S) XUS)
                 E NAFION/CN
                 E FLEMION/CN
                 E XUS/CN
L103         128 S L101 AND (F62(S)F)/PLE
L104         106 S L101 AND IONOMER?
L105          82 S L101 AND P0588/PLE
L106         315 S L102-L105
L107          29 S L106 AND STAINLESS(L)STEEL
                 E STAINLESS STEEL/CN
                 E STEEL/CN
L108           0 S L106 AND G3189/PLE
L109          11 S L107 AND POROUS
                 SEL AN 6
L110           1 S L109 AND E1
L111           1 S L1
L112           1 S L111 AND L94-L110
L113        1659 S L101 AND ?POLYMER?(3A)?ELECTROLYT?
L114         108 S L113 AND L106
L115          33 S L114 AND (?POROUS? OR ?POROS? OR PORE?)
L116          31 S L115 NOT L107
L117          23 S L116 AND ?POLYM? ?ELECTROLYT?
L118          10 S L115 NOT L117
L119           7 S L117 AND POROUS?/TI
L120          16 S L117 NOT L119
                 SEL AN 2 8 10 12
L121          12 S L120 NOT E2-E5
L122          20 S L110,L111,L112,L119,L121
L123          10 S L109 NOT L122
L124          18 S L107 NOT L109,L119
L125          20 S L122 AND L94-L124
L126          20 S L125 AND ?ELECTRO?
L127          20 S L126 AND ?POLYM?
L128          20 S L126 AND ?POLY?
L129          18 S L126 AND (?FLUOR? OR ?SULF? OR ?SULPH?)
L130          20 S L126 AND (?COAT? OR ?DEPOS? OR SUBSTRATE OR SURFAC? OR STEEL
L131          20 S L122,L125-L130

     FILE 'WPIX' ENTERED AT 16:06:44 ON 01 NOV 2007
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